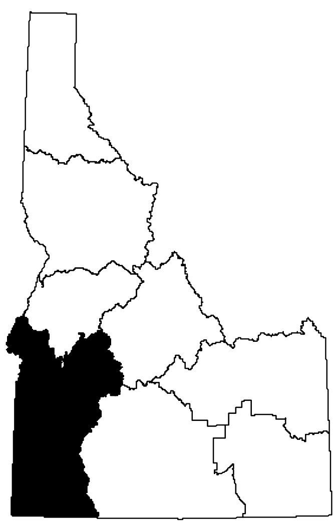
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



SOUTHWEST REGION - NAMPA
2007

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2007 Southwest Region – Nampa Fishery Management Report

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

2007 Southwest Region – Nampa Fishery Management Report

Lowland Lake Sampling

ABSTRACT

Lowland lake surveys in 2007 focused on collecting fish to evaluate mercury concentrations, evaluate forage fish availability, to assess catfish *Ictalurus punctatus* stocking and recruitment success in Lake Lowell, evaluate the fish population in Succor Creek Reservoir and monitor bull trout *Salvelinus confluentus* and kokanee *Oncorhynchus nerka* populations in Deadwood Reservoir. The mercury study was part of a cooperative effort by Idaho Department of Fish and Game (IDFG) and Idaho Department of Environmental Quality (IDEQ) to evaluate mercury in fish tissues in lentic habitats throughout Idaho. Regional personnel collected 13 groups of fish from Mann Creek, Crane Creek, Deadwood, Arrowrock, C.J. Strike, Lake Lowell, Shoofly and Grasmere reservoirs in southwest Idaho. Lahontan cutthroat trout *O. clarkii henshawi* from Shoofly reservoir had the highest level of mercury detected and channel catfish from Crane Creek Reservoir had the lowest from Southwest Region waters. Hatchery rainbow trout *O. mykiss* were 43% of the fish by number in Succor Creek Reservoir. Body condition of hatchery rainbow trout was low and no trout over 390 mm were sampled. Nine bull trout ranging from 70 to 460 mm and over 130,000 kokanee were trapped on tributaries to Deadwood Reservoir. Mean female kokanee length averaged 252 mm. Size of female kokanee has declined yearly since 2003.

Arsenic, Mercury, and Selenium Concentration in Fish Tissue from Reservoirs of Southwest Idaho

ABSTRACT

IDFG participated in a statewide, cooperative effort with IDEQ to quantify contaminant concentrations in fish tissue; staff collected 13 sample groups of fish from nine reservoirs in southwest Idaho. Each group included a ten fish sample and targeted the first and second more commonly consumed fish species from each reservoir. Six of the 13 groups had tissue mercury concentrations greater than 300 ng/g; the concentration at which fish consumption advisories are issued. Two of the three bass groups sampled exceeded 300 ng/g; including smallmouth *Micropterus dolomieu* bass at C.J. Strike Reservoir and largemouth bass *M. salmoides* at Lake Lowell. In contrast, largemouth bass from Crane Creek Reservoir possessed relatively low tissue mercury concentrations; 144 ng/g. For the three groups of channel catfish tested, tissue mercury concentrations were relatively low, except for Brownlee Reservoir (388 ng/g). Only two panfish species were sampled. Black crappie *Pomoxis nigromaculatus* from Brownlee Reservoir exceeded human health criterion, 317 ng/g, whereas yellow perch *Perca flavescens* from C.J. Strike possessed tissue mercury concentrations of 217 ng/g. For salmonids, redband trout from Mann Creek and kokanee from Deadwood and Arrowrock reservoirs were well below human health criterion, whereas Lahontan cutthroat trout from Grasmere (319 ng/g) and Shoofly reservoirs (502 ng/g) exceeded human health criterion. Arsenic and selenium tissue concentrations were below human health criteria in all groups sampled in southwest Idaho.

INTRODUCTION

Mercury is a natural occurring element that is released and spread though the atmosphere by natural and human causes. Once deposited, mercury is converted by bacteria to a more toxic form; methyl-mercury. Methyl-mercury may then become concentrated in fish tissue through respiratory and digestive processes, often referred to as bioaccumulation. Consumption of fish with high levels of mercury has been linked to nervous system disorders in humans. Alternatively, the positive effects of consuming fish may outweigh the negative effects associated with ingesting contaminants (Domingo et al. 2007). Gaining a better understanding of mercury levels in the tissue of Idaho's fishes will allow anglers and managers to better asses the cost and benefits of consuming fish.

The possible negative health effects of consuming fish with elevated contaminant levels has received increasing attention in Idaho and across the United States, especially for mercury. In light of this concern, the Idaho Department of Health and Welfare adopted fish consumption criterion recommended by the United States Environmental Protection Agency (Essig and Kosterman 2008). These recommendations were developed for adults assuming a consumption rate of 17.5 grams of fish per day or approximately 8 ounces per week. With this criterion, fish consumption advisories are issued when fish tissue mercury concentrations exceed 300 ng/g (EPA 2001). During 2007, IDEQ and IDFG initiated a cooperative effort to quantify tissue contaminant concentrations in commonly consumed fish species from lakes and reservoirs across Idaho. In total, over 50 waters were sampled statewide, including nine reservoirs in the Southwest Region (Figure 1).

OBJECTIVES

1. To capture commonly consumed sport fish of preferred sizes for analysis by IDEQ to determine contaminant tissue concentrations

METHODS

Fish collection efforts were initiated on nine reservoirs from May 24 to August 25, 2007. In these waters, 10 individual fish from one or, preferably, two of the more commonly consumed fish species were targeted. Attempts were made to only sample fish of lengths normally harvested by anglers. We used a combination of fish sampling techniques to collect these fish, including gill netting, electrofishing, and angling. Gill nets were floating and sinking monofilament nets measuring 46 m horizontally x 2 m vertically, with six panels composed of 19, 25, 32, 38, 51, and 64 mm bar mesh. For boat electrofishing efforts, pulsed direct current was produced by a 5,000 watt generator. Frequency was set at 120 pulses per second and a pulse width of 40, which yielded an output of 5-8 amps. Common angling methods were used to capture sport fish. Stunned, netted, or angled fish were held in livewells or coolers until processing.

Captured fish were identified to species, measured (± 1 mm), and weighed (±1g) with a digital scale. Fish were then processed as outlined in Essig and Nelson (2007). In short, dead fish were filleted and each fillet was placed in a separate, labeled plastic freezer bag. Samples were then delivered to IDEQ to determine tissue mercury concentrations. Final results are available in Essig and Kosterman (2008).

RESULTS AND DISCUSSION

Tissue fillets were collected from 130 fish from seven different species. Species sampled included channel catfish, kokanee, Lahontan cutthroat trout, largemouth bass, redband trout, smallmouth bass, and yellow perch (Table 1).

Tissue mercury concentrations were measured for nine reservoirs and 13 groups of fish. Six of the 13 groups of fish had tissue mercury concentrations greater than 300 ng/g; the point at which consumption advisories are issued. Two of the three bass groups sampled exceeded human health criterion (Table 2). These groups included smallmouth bass at C.J. Strike Reservoir and largemouth bass at Lake Lowell. In contrast, largemouth bass from Crane Creek Reservoir possessed relatively low tissue mercury concentrations, 144 ng/g. For the three groups of channel catfish tested, tissue mercury concentrations were relatively low and exceeded human health criterion only for Brownlee Reservoir. Catfish from Lake Lowell possessed lower tissue mercury concentrations even though fairly large fish were tested. Tissue mercury concentrations for channel catfish from Crane Falls Reservoir were very low, which may have been partially influenced by the presence of small channel catfish in the sample. Only two panfish species were sampled. Black crappie from Brownlee Reservoir exceeded the warning criterion by 17 ng/g, whereas yellow perch from C.J. Strike possessed tissue mercury concentrations of 217 ng/g. For salmonids, redband trout from Mann Creek and kokanee from Deadwood and Arrowrock reservoirs were well below human health criterion, whereas Lahontan cutthroat trout from Grasmere (319 ng/g) and Shoofly reservoirs (502 ng/g) exceeded human health criterion. Arsenic and selenium tissue concentration did not exceed human health criterion for any group of fish in southwest Idaho.

In theory, insectivorous and planktivorous species such as salmonids and panfish should have lower levels of mercury than piscivorous species. The instances of black crappie from Brownlee Reservoir and Lahontan cutthroat trout with relatively high tissue mercury concentrations were contrary to this notion suggesting that these areas may possess high ambient mercury levels. All other salmonid and panfish samples had tissue mercury concentration below 300 ng/g. Bass tended to have higher tissue mercury concentrations, except in Crane Creek Reservoir. Drainage size, growth rates, age, and proximity to mercury sources may have caused the wide variation noted within species, groups of similar species, or spatially (Evans et al. 2005).

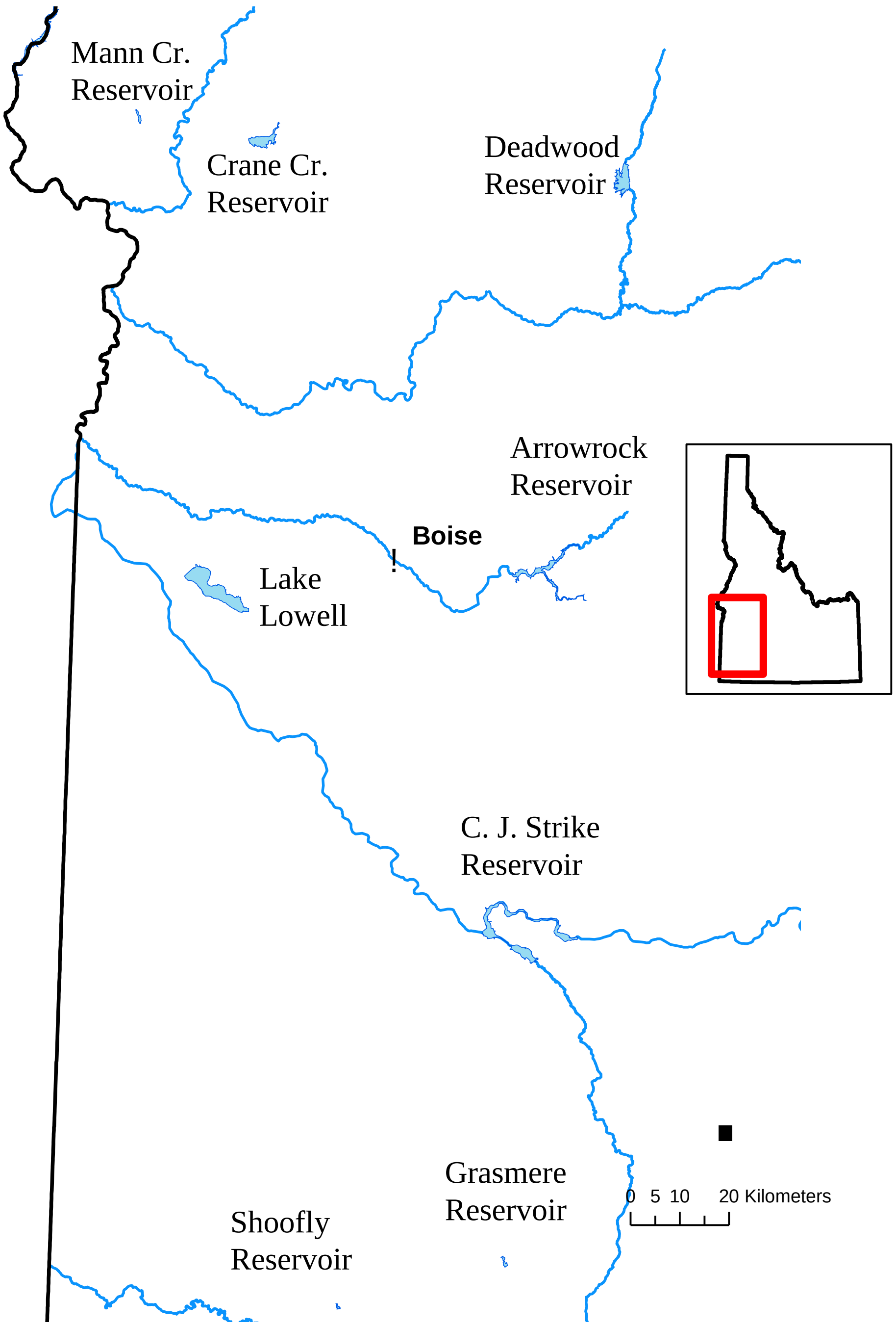


Figure 1. Map of eight reservoirs used to assess mercury levels in fish tissue in lentic habitats of southwestern Idaho.

Table 1. Body measurements for sport fish sampled from nine reservoirs in Southwest, Idaho to assess mercury concentrations in muscle tissue.

Water Body	*Species*	*n*	*Min Length (mm)*	*Max Length (mm)*	*Average Length (mm)*	*Average Weight (mm)*
Arrowrock Res.	Kokanee	10	370	406	386	584
Brownlee	Black crappie	10	223	310	248	227
	Channel catfish	10	457	539	495	1272
C. J. Strike Res.	Smallmouth bass	10	266	342	303	351
	Yellow perch	10	215	284	248	196
Crane Creek Res.	Channel catfish	10	265	482	325	335
	Largemouth bass	10	289	421	357	818
Deadwood Res.	Kokanee	10	231	274	251	131
Grasmere Res.	Lahontan cutthroat trout	10	218	397	300	239
Lake Lowell	Channel catfish	10	360	620	475	1064
	Largemouth bass	10	319	401	348	572
Mann Creek Res.	Redband trout	10	225	455	344	463
Shoofly Res.	Lahontan cutthroat trout	10	310	405	352	351

Table 2. Mercury tissue concentrations in fish sampled from nine reservoirs (Res.) in the Southwestern Region of Idaho. Concentration units are in nanograms (ng) per gram which is equivalent to parts per billion.

Water Body	*Species*	*Mercury concentration (ng/g)*
Arrowrock Res.	Kokanee	176
Brownlee	Black crappie	317
	Channel catfish	388
C. J. Strike Res.	Smallmouth bass	415
	Yellow perch	217
Crane Creek Res.	Channel catfish	79
	Largemouth bass	144
Deadwood Res.	Kokanee	164
Grasmere Res.	Lahontan cutthroat trout	319
Lake Lowell	Channel catfish	202
	Largemouth bass	382
Mann Creek Res.	Rainbow trout	209
Shoofly Res.	Lahontan cutthroat trout	502

Lake Lowell Forage, Catfish Stocking, and Recruitment Assessment

ABSTRACT

We conducted gill netting, larval trawl, and limnological surveys of Lake Lowell to gain a better understanding of the forage base, success of our catfish stocking program, and warmwater fish recruitment patterns. A total of 148 fish were caught in 12 small mesh experimental gill net pair sets, yielding a total catch per unit effort (CPUE) of 12.3 fish/net pair/night. Common carp represented 49% of the catch, followed by channel catfish at 23%, and yellow perch at 22%. Yellow perch were the most common prey fish sampled. Mean CPUE for yellow perch was 2.75 fish/net pair/night. A total of 2,558 larval fish were caught with the Neuston net during 53 separate tows. Fish species sampled included bluegill *Lepomis macrochirus*, yellow perch, channel catfish, largemouth bass, sucker, and black crappie. Most of the larval fish, 82% were caught in the eastern half of the reservoir (sites 4, 5, & 6). Bluegills were by far the most numerous species (85%) captured. Hatchery stocked channel catfish represented approximately 74 to 90% of the existing population.

INTRODUCTION

Lake Lowell is a 4,000 ha U.S. Bureau of Reclamation irrigation reservoir located 10 km southwest of Nampa, Idaho. The reservoir was built from 1906 to 1909 by forming four embankments around a naturally-occurring low lying area. Shortly thereafter, the lands surrounding the reservoir were incorporated into the National Wildlife Refuge system and continue to be managed by the U. S. Fish and Wildlife Service. Uniquely, no streams or rivers flow into the reservoir; instead, water is supplied by the New York Canal which diverts water from the Boise River. Due to recent leakage at the upper embankment, maximum full pool was lowered from 771.5 m (2,531.2 ft) to 770 m (2,526.0 ft) during June 2005. Additionally, the lake will be lowered to 766 m (2,514 ft) during fall 2007 to allow repair work. The reservoir is fairly shallow with a maximum depth of 11 m. Much of the littoral zone is occupied by extensive beds of smartweed.

Due to its' proximity to Idaho's population center, Lake Lowell receives substantial fishing pressure. Largemouth bass receive the majority of the attention and several tournaments are held annually. Panfish fisheries (crappie, bluegill, and yellow perch) are also popular; however, these populations have fluctuated widely leading to inconsistent use. IDFG stocks both channel catfish and Lahontan cutthroat trout in the reservoir. Since 2003, approximately 6,000 to 9,000 fingerling channel catfish have been planted annually. Additionally, recent plants of Lahontan cutthroat trout fingerlings have ranged from 40,000 to 103,000 annually. Lake Lowell is managed under general regulations, except for largemouth bass which are managed under a no harvest regulation from January 1 thru June 30 and a 2 fish, 305-406 mm protected slot limit thereafter.

OBJECTIVES

1. Characterize the structure and relative abundance of potential prey-sized fish to assess whether purposed predator introductions would have an adequate forage base.

2. Assess reproductive success of recreationally important warm water fishes.

3. Characterize zooplankton community structure and abundance.

METHODS

Standard lowland lake sampling protocols are not specifically designed to capture prey-sized fish species (typically under 152 mm). Therefore, we used small-mesh, experimental gill nets at monthly intervals from May 1 to August 1 to better index and describe the abundance and composition of potential prey fish species. Floating and sinking monofilament nets, 46 m x 2 m, with six panels composed of 19, 25, 32, 38, 51, and 64 mm bar mesh. One floating and one sinking net, fished for one night, equaled one unit of gill net effort. Additionally, Lake Lowell was selected by IDEQ as a monitoring site for assessing mercury levels in fish tissue. For this effort, we set one standard sinking gill net and fished it overnight. Captured fish were identified to species, measured (± 1 mm), and weighed (± 1 g for fish under 5,000 g or ±10 g for fish greater than 5,000 g) with a digital scale. In the event that weight was not collected, length-weight relationships were built from fish weighed and measured in 2006 which allowed us to estimate weights of un-weighed fish.

Horizontal surface trawls were used to index the abundance of larval fish in the reservoir. Trawls were made with a 1 m x 2 m x 4 m long Neuston net at six sites spread throughout the reservoir (Figure 2). Mesh size was 1.3 mm. The net was fit with a flow meter to estimate the volume of water sampled. Tow duration was five minutes and an average of 150 m^3 was sampled per tow. Two tows were made in each of the three sections of the reservoir. Tows were made on a bi-weekly basis beginning May 1, 2007 until few larval fish were sampled in early September. Specimens were stored in 10% formalin and viewed under a dissecting microscope. Sampled fish from each tow were identified to species and measured for length, unless the total number of individuals exceeded 50. For large samples, we randomly selected 50 individuals, identified and measured those, and counted the remainder. Furthermore, we scanned the entire sample for the presence of larval channel catfish.

Zooplankton community structure was monitored at three of the six sampling locations. At each point, three vertical zooplankton tows were made using plankton nets fitted with 153, 500, and 750 micron mesh netting. Samples were stored in 95% ethanol and processed within two-weeks of sampling. Zooplankton samples were summarized using ZQI and ZPR indices (Teuscher, 1999). These indices describe the structure, size, overall abundance, and abundance of large individuals within zooplankton communities.

RESULTS

A total of 148 fish were caught in 12 small mesh experimental gill net pair sets, yielding a total CPUE of 12.3 fish/net pair/night. Common carp *Cyprinus carpio* represented 49% of the catch, followed by channel catfish at 23%, and yellow perch at 22%. Black crappie, bluegill, largemouth bass, largescale sucker *Catostomus macrocheilus*, and northern pikeminnow *Ptychocheilus oregonensis* represented cumulatively 6% of the catch. Yellow perch were the most common prey sized fish sampled. Mean CPUE for yellow perch equaled 2.75 fish/net pair/night. Most of the yellow perch caught were putative age 1 fish (<150 mm; Figure 3). Additionally, putative age-0 fish started appearing in the gill net on July 10.

During 2007, we caught a total of 2,558 larval fish with the Neuston net during 53 separate tows (six fixed sites by 9 sampling dates, with one tow not completed). Fish species sampled included bluegill, yellow perch, channel catfish, largemouth bass, largescale sucker, and black crappie. Most of the larval fish, 82% were caught in the eastern half of the reservoir (sites 4, 5, & 6). Bluegill were by far the most numerous species (85%) captured, followed by unknown (7%), black crappie (3.6%), and yellow perch (3.5%). In retrospect, most of the unknown category was likely bluegill too small to identify at that time. All other species represented less than 1% of the total abundance.

On the first sampling date, May 1, 2007, few fish were sampled. On May 15, the catch was dominated by bluegill with an average catch of 0.38 fish/m^3 and maximum of 0.85 fish/m^3 (Tables 3 and 4). This early appearance of larval bluegill seemed to perish as no bluegill were seen in the next three samples. Recently hatched bluegill reappeared during June, July, and early August, though at lower densities than the first appearance. Bluegill density on July 10th averaged 0.13 fish/m^3 and reached a maximum of 0.62 fish/m^3 at site 6. Larger bluegill were caught in all subsequent samples from June 30 to September 5. Additionally, bluegills less than 12 mm were caught on August 15, indicating continued spawning through this time.

The larvae of other species were caught at much lower densities. Black crappies were caught in three consecutive sampling periods between June 11 and July 10th (Tables 3 and 4). The highest catch of black crappie of .04 fish/m^3 occurred on June 25 at site 5. Yellow perch were caught in only two consecutive sampling dates. On May 29, yellow perch density averaged .02 fish/ m^3 and a reached a maximum of .04 fish/m^3 at site 6. On June 11, yellow perch density averaged .02 fish/m^3 and a reached a maximum of .09 fish/m^3 at site 4 and one perch was caught thereafter. Largemouth bass larvae were caught on three dates from May 29 to June 25 at very low densities. Channel catfish larvae (n=2) were only caught on the last sampling date, July 30.

Overall zooplankton abundance in Lake Lowell was on the higher end of the spectrum for Idaho waters. Average weight for the 153 micron net was 1.93 g/m over the three sampling sites and nine sampling dates. The overall ratio of preferred to usable size zooplankton values (ZPR) was moderate with an average of 0.41. ZPR tended to be higher at the lower and upper embankment sites (Figure 4). It appeared that ZPR was lower in the upper reservoir, where ZPR averaged 0.35, though only marginally so. Mean ZPR declined substantially over the last two samples to a low of 0.13 on September 5. The abundance of larger zooplankton relative to total abundance (ZQI) was lower than many Idaho waters. ZQI indices averaged 0.38 and showed little variation across sampling dates, except for late June. On June 25, ZQI indices peaked at an average of one, over two-times higher than for any other sampling date. However, ZQI returned to low levels by the next sampling period and remained at low levels, eventually reaching the lowest level observed, 0.12, on September 5 (Figure 5).

Surface water temperatures were monitored at three sites from May 16 to July 11. Overall, surface water temperatures tended to be warmer in the eastern end of the reservoir and slightly cooler in the middle portion of the reservoir. Temperatures in the eastern end also tended to be more variable, especially during May when temperature dropped sharply on two occasions (Figure 6). For instance, mean daily temperature on May 19 was 19.7° C and dropped to 16.5° C three days later. This temperature drop coincided with the disappearance of the initial bluegill larvae. Also, mean daily surface water temperature on June 3 was 22.1° C and dropped 4.7° C in four days. Mean surface water temperature for June for the upper, middle, and lower sites was 21.2°, 20.8°, and 20.9° C.

Incidental to prey-sized fish, channel catfish were caught in small mesh experimental gill net sets. Plus, a single standard sinking gill net was set for capturing catfish for mercury content analysis. In these sets combined, 72 channel catfish were caught ranging in length from 250 to 620 mm. All channel catfish stocked in Lake Lowell during 2005 and 2006 were marked by excision of the adipose fin. If we assumed that channel catfish stocked during 2005 had reached 350 mm, 38 out of 42 or 90% were of hatchery origin (Figure 7). If a more liberal criterion of 385 mm is considered as the length that channel catfish stocked during 2005 grew to, 39 of 53 or 74% of the channel catfish were of hatchery origin.

DISCUSSION

Small-mesh experimental gill netting efforts during 2007 indicated that Lake Lowell supports few forage size fish in pelagic areas. Results were very similar to 2006, where few prey-sized fish were caught. Yellow perch were once again the most numerous prey-sized fish caught and abundance seemed to change little between 2006 (2.2 yellow perch/net pair/night) and 2007 (2.8 yellow perch/net pair/night) most of which were age-1 perch. Putative age-0 fish first appeared on July 10 at a mean length of 64 mm. Based on length plots, it appears that size of first appearance, spawn timing, and growth rates were similar between years for juvenile yellow perch (Figure 8). Recruitment of young perch is still below levels necessary to rebuild fishable populations.

Similar to 2006, larval bluegill abundance was high and focused in the eastern half of the reservoir. During 2006, bluegill abundance peaked in mid to late July. In 2007, high bluegill abundances were noted at this time also; however, the highest larval bluegill abundance for 2007 was recorded in mid May. Normally, yellow perch and crappies are thought to spawn earlier than bluegill in most systems. This was not the case in Lake Lowell during 2007. The early group of bluegill appeared to die-off and was not observed in June sampling. Abundance of all other larval fish was low, similar to 2006. For black crappie, maximum density at one site was 0.017 fish/m^3, whereas in 2007 maximum density at one site was 0.04 fish/m^3. Despite, the higher values noted in 2007, black crappie abundance in Lake Lowell is still low when compared to other waters. For Richmond Lake, South Dakota, black crappie abundance was 3 to 10 fold higher from 1994-1996 than abundances documented in Lake Lowell during 2006 and 2007 (Pope and Willis 1998). In Brant Lake, South Dakota, black crappie abundance during 1993 to 1995 were similar to those observed in Lake Lowell, but during 1994 were approximately two times higher. For yellow perch in East 81 Slough, South Dakota, larval density yellow perch peaked at 57 fish/100 m^3 or approximately seven times higher than seen in Lake Lowell during 2007 (Isermann et al. 2002)

The mean abundance of all sizes of zooplankton in Lake Lowell (1.93 g/m) was relatively high compared to other waters in Idaho (range 0.02 - 2.68 g/m; Teuscher 1999). The ratio of preferred to usable size zooplankton (ZPR) was adequate through the summer months, but started to decline by mid August, reaching minimum levels by late September. The abundance of preferred and usable size zooplankton compared to total abundance peaked in late June then declined and reached low levels by September, especially in the upper reservoir. This seems to indicate that both useable and preferred zooplankton sizes were being cropped through the late summer and into the fall. If the abundance of useable and preferred size zooplankton continued to decline through the fall, age-0 fish may suffer food shortages that could negatively affect over-winter survival.

Hatchery channel catfish are a large component of the catfish population in Lake Lowell. Based on the catch of adipose clipped fish, approximately 74-90% of the current population was of hatchery origin. The low density of larval channel catfish supports this conclusion.

MANAGEMENT RECOMMENDATIONS

1. Continue channel catfish stocking program as it has produced a healthy population.

2. Continue larval sampling and small-mesh prey net assessments to allow characterization of larval panfish densities and recruitment to older age classes. Projected completion of dam repairs and high snow pack should allow the reservoir to fill during the coming year, which may positively affect panfish recruitment.

3. Monitor zooplankton abundance over a longer time period, especially through the fall, to determine if the abundance of useable and preferred size zooplankton become relatively scarce and possibly limit growth rates and eventual survival of age-0 fish.

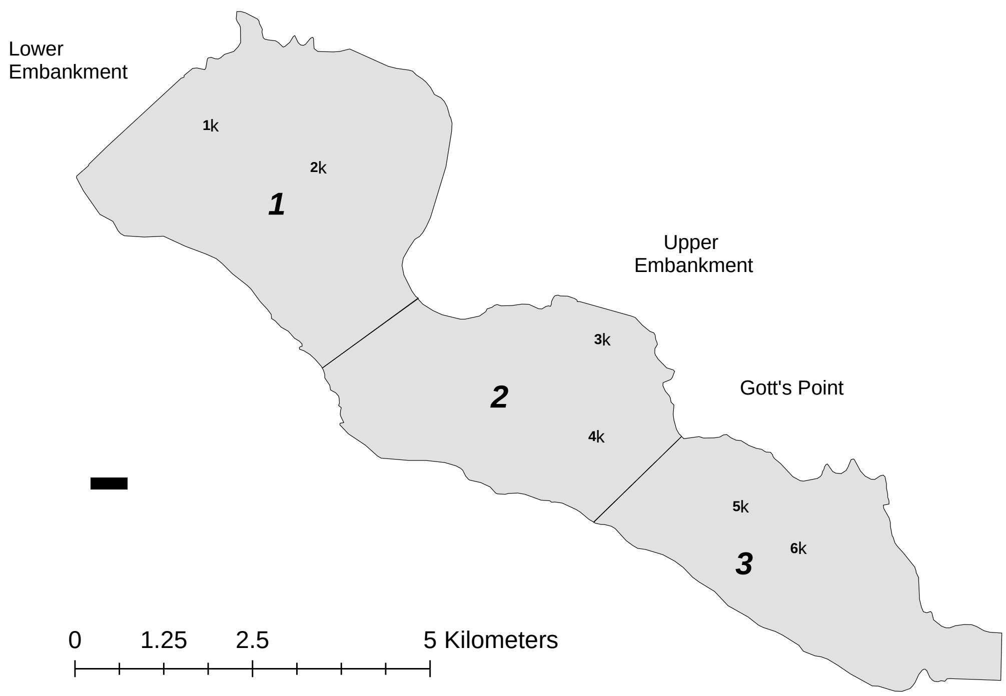


Figure 2. Lake Lowell sampling sections (Bolded #1-3), larval fish towing sites (Asterisks #1-6), and zooplankton sampling sites (Asterisks #1, #3, & #5) used during 2007 for fish and invertebrate surveys.

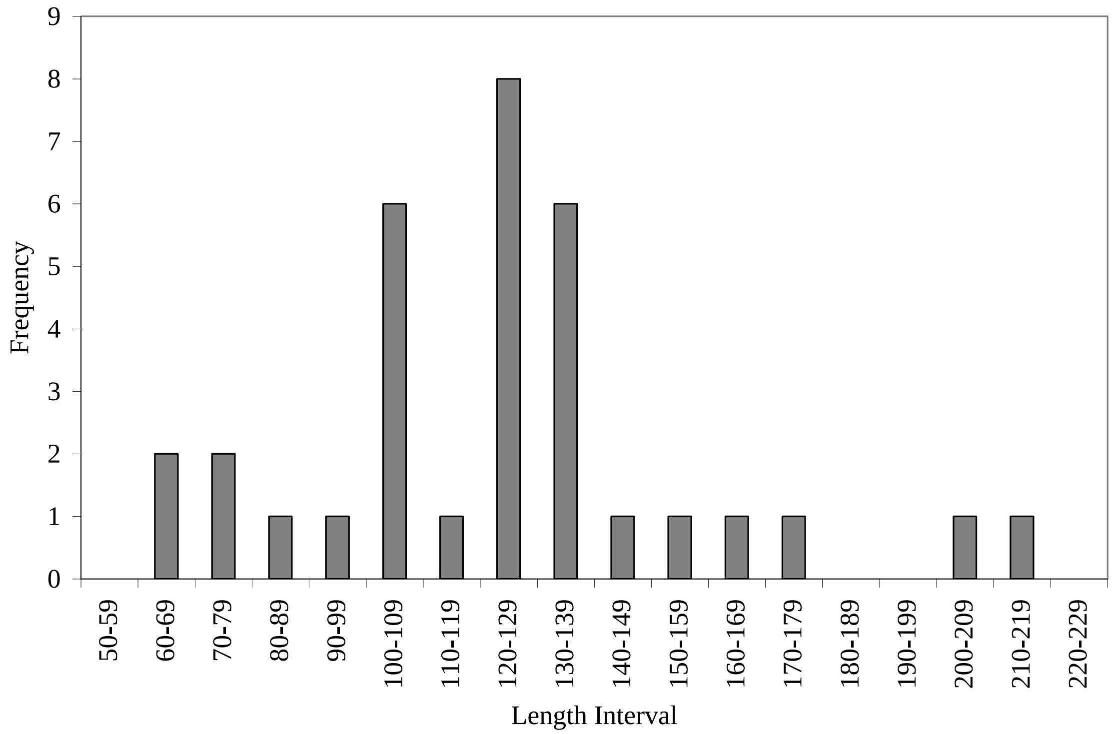


Figure 3. Length frequency of yellow perch caught in Lake Lowell during 2007 with small mesh experimental gill net sets.

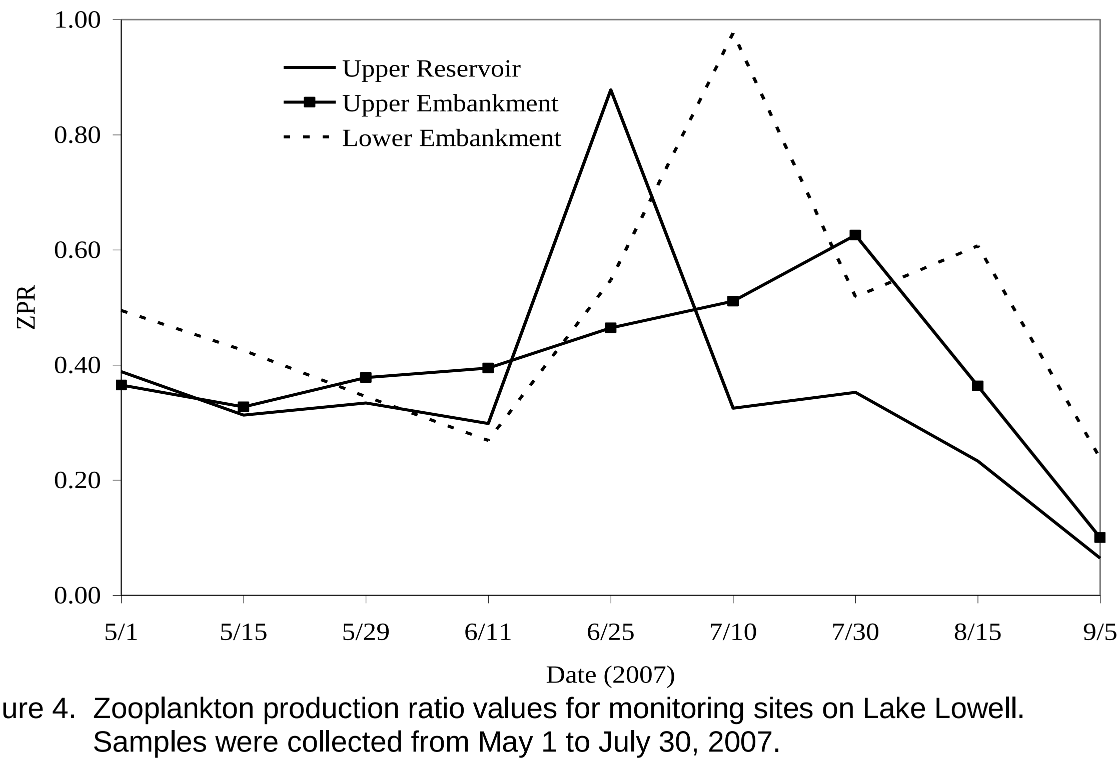


Figure 4. Zooplankton production ratio values for monitoring sites on Lake Lowell. Samples were collected from May 1 to July 30, 2007.

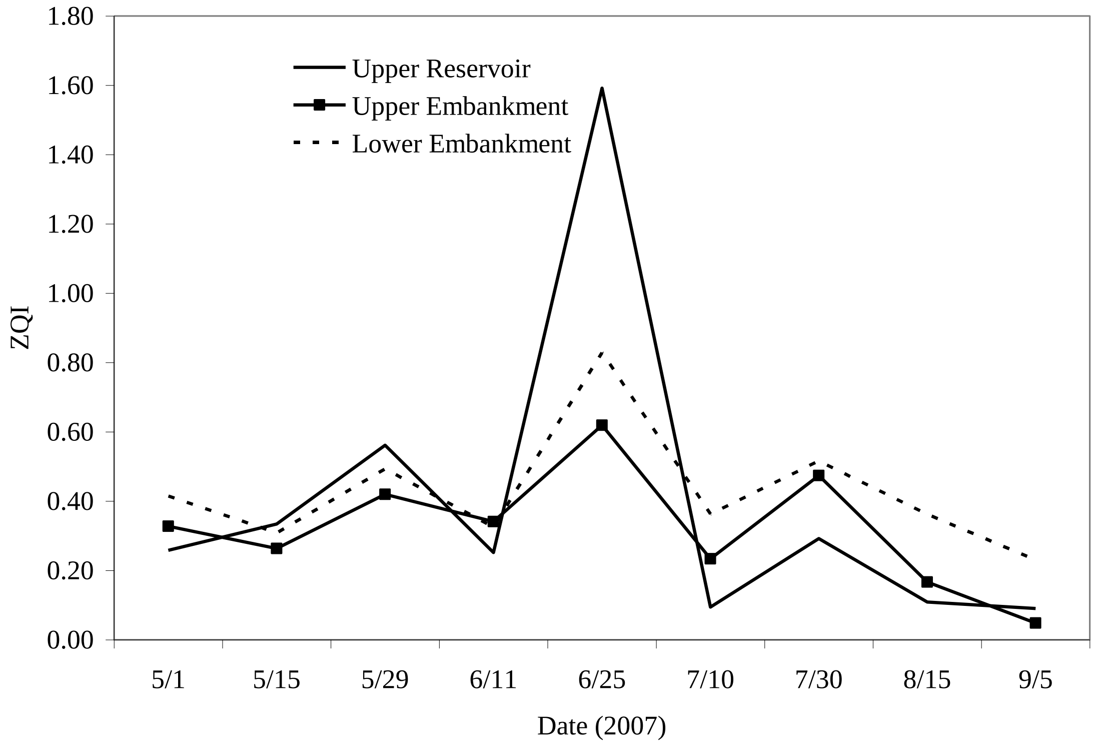
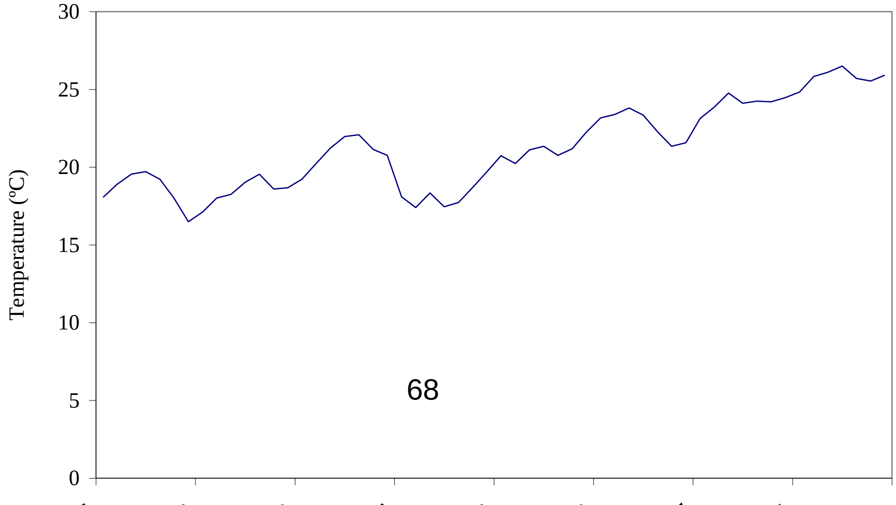


Figure 5. Zooplankton quality index values for three monitoring sites on Lake Lowell. Samples were collected from May 1 to July, 30 2007.



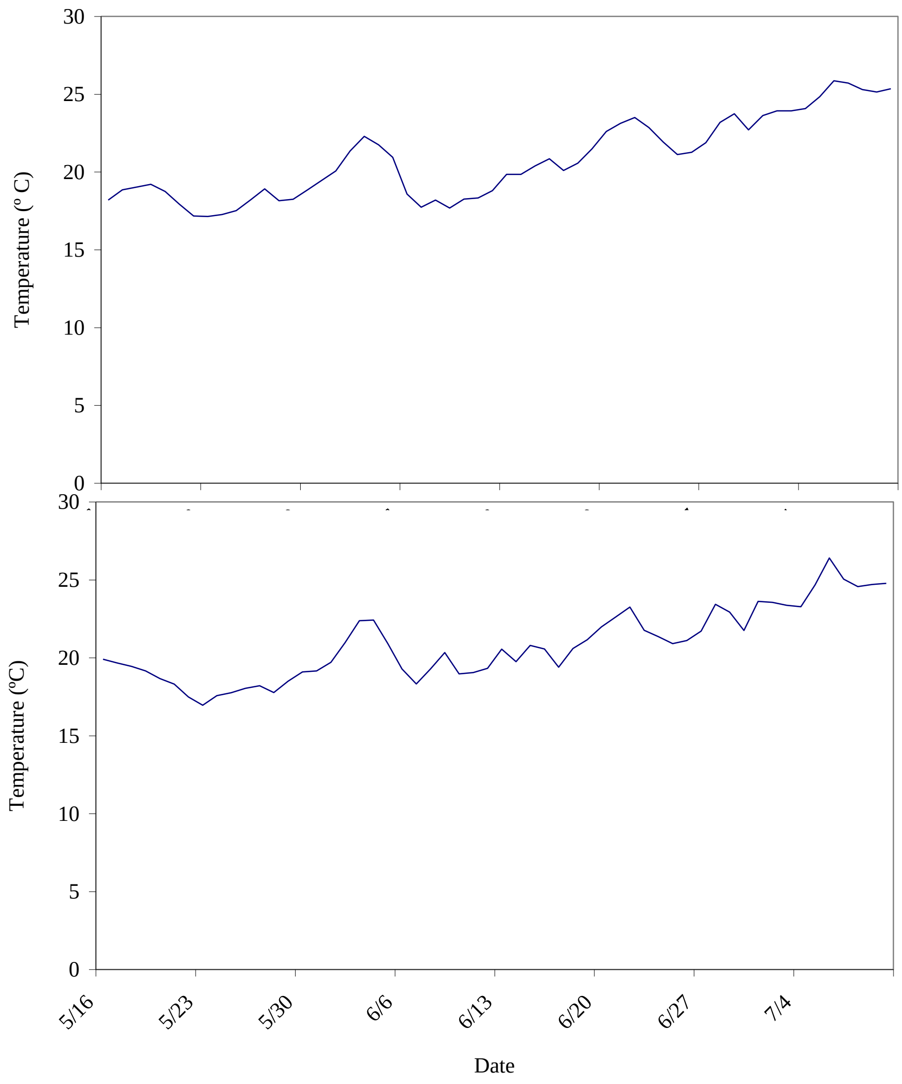


Figure 6. Surface water temperature of Lake Lowell during 2007 measured at three locations: the no wake buoy line (top), the upper embankment (middle), and the lower embankment (bottom).

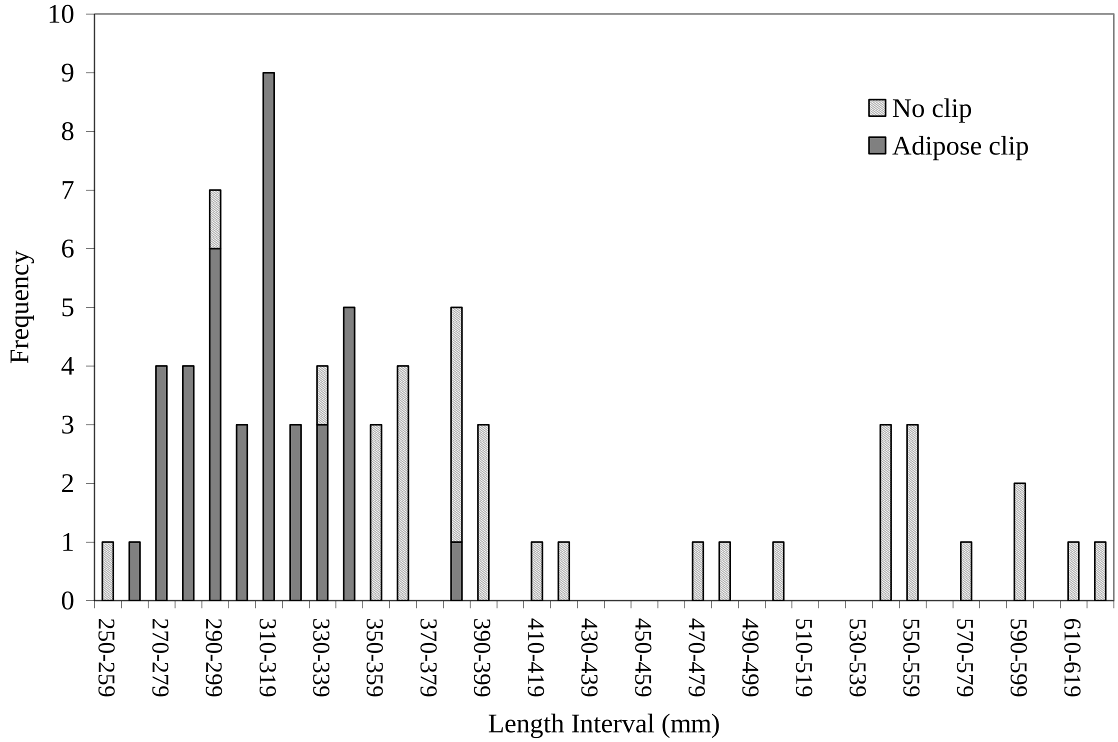


Figure 7. Length frequency of channel catfish sampled from Lake Lowell during 2007. Dark grey bars denote adipose clipped hatchery channel catfish stocked during 2005-06, whereas the grey hashed bars represent either wild channel catfish or hatchery channel catfish stocked in other years.

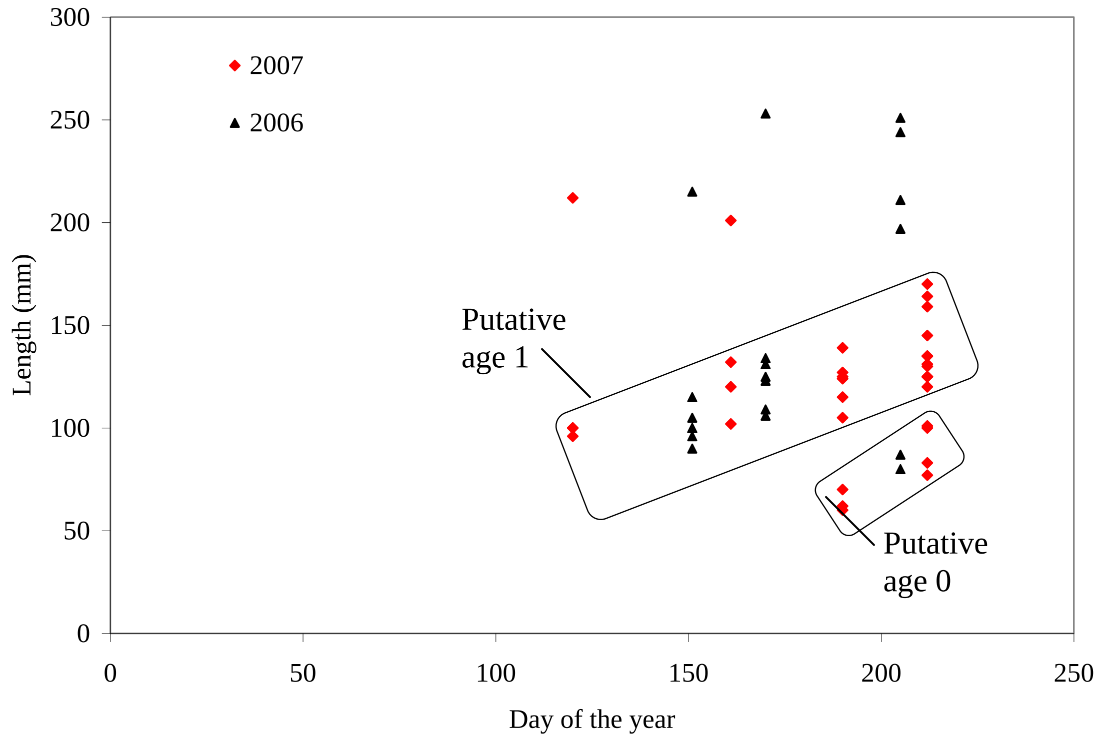


Figure 8. Length of yellow perch sampled from Lake Lowell during 2006 (black triangles) and 2007 (red diamonds).

Table 3. Mean larval fish abundance in Lake Lowell during 2007.

Date	Black crappie	Bluegill	Channel catfish	Largemouth bass	Unknown	Yellow perch	Largescale sucker
5/1					0.011		
5/15		0.375			0.026		0.0003
5/29				0.002	0.001	0.017	
6/11	0.009			0.002	0.0002	0.018	
6/25	0.014				0.002		
7/10	0.003	0.125			0.009		
7/30		0.037	0.001				
8/15		0.047					
9/5	0.001	0.003				0.004	

Table 4. Maximum larval fish abundance (#/m^3) in Lake Lowell during 2007.

Date	Black crappie	Bluegill	Channel catfish	Largemouth bass	Unknown	Yellow perch	Largescale sucker
5/1					0.036		
5/15		0.854			0.040		0.002
5/29				0.007	0.004	0.044	
6/11	0.019			0.004	0.001	0.085	
6/25	0.040				0.004		
7/10	0.015	0.619			0.026		
7/30		0.170	0.004				
8/15		0.171					
9/5	0.003	0.005				0.002	

Succor Creek Reservoir

ABSTRACT

During a lowland lake sampling effort on Succor Creek Reservoir, total CPUE equaled 99.5. Species composition was bridgelip sucker *Catostomus columbianus* (47%), hatchery rainbow trout (43%), redside shiner *Richardsonius balteatus* (8%), and redband rainbow trout *O. mykiss gairdneri* (3%). The majority (87%) of hatchery rainbow trout were relatively small, measuring from 140 to 220 mm. Proportional stock density (PSD) estimates were incalculable as eight stock-length fish (≥250 mm) and zero quality-length fish (≥400 mm) were caught. Hatchery rainbow trout were in relatively poor condition. Mean relative weight (Wr) equaled 90 (± 2.2) and showed a declining trend with length (slope = -0.05; *P* = 0.04). Only six redband trout were captured and ranged from 165 to 244 mm. Redband trout were in similarly poor condition with a mean Wr of 82 (± 6.9). Currently, trout populations are depressed due to poor water quantity years and inconsistent stocking patterns.

INTRODUCTION

Succor Creek Reservoir is an 84 ha irrigation reservoir that was built on Succor Creek during the late 1970s. Succor Creek Reservoir is located about 45 km south-southwest of Marsing, ID on the west side of the Owyhee Mountains. Due to treacherous roads, access to the reservoir is poor and fishing effort is thought to be low. Redband trout reside in Succor Creek upstream of the reservoir and move downstream into the reservoir at times. IDFG began stocking rainbow trout fingerlings in the reservoir during 1999. From 1999-2006, an average of 5,540 fingerling were stocked on a semi-annual basis (4 out of 8 years). The lake is managed with general regulations (i.e. six trout bag limit with no minimum length restriction).

METHODS

Fish populations in Succor Creek Reservoir were sampled with standard IDFG lowland lake sampling gears on June 18, 2007, except no electrofishing effort was expended due to the lack of a boat ramp. Sampling gear included: (1) gill nets – floating and sinking monofilament nets, 46 m x 2 m, with six panels composed of 19, 25, 32, 38, 51, and 64 mm bar mesh. One floating and one sinking set, fished for one night, equaled one unit of gill net effort; (2) Trap nets – 15 m lead, 1 m x 2 m frame, crowfoot throats on the first and third of five loops, 19 mm bar mesh, treated black. One trap net fished for one night equaled one unit of trap net effort. In total, four trap nets and two gill net pairs were utilized during 2007 (Figure 9). Catch data were summarized as the number of fish CPUE and the weight caught per unit effort (WPUE).

Captured fish were identified to species, measured (± 1 mm), and weighed (± 1 g) with a digital scale. PSD's were calculated for gamefish populations as outlined by Anderson and Neuman (1996) to describe length-frequency data. Relative weight was calculated as an index of general fish body condition where a value of 100 is considered average. Values greater than 100 describe robust body condition, whereas values less than 100 indicate less than ideal foraging conditions. For rainbow trout Wr calculations, standard weight was calculated as $\log_{10}(W_s) = -4.898 + 2.990 * \log_{10}(\text{total length})$. Confidence intervals were calculated using an $\alpha = 0.10$.

RESULTS AND DISCUSSION

We collected 222 fish including bridgelip sucker, hatchery rainbow trout, redband trout, and redside shiner. Gill nets were more effective than trap nets. CPUE for gill nets equaled 88 fish/night while CPUE for trap nets equaled 11.5 fish/night (Table 5). Of the total CPUE of 99.5 fish/night, species composition was made up of bridgelip sucker (47%), hatchery rainbow trout (43%), redside shiner (8%), and redband trout (3%). In terms of biomass, a total WPUE equaled 9.3 kg/night (Table 6). Species composition based on weight was composed of bridgelip sucker (56%), hatchery rainbow trout (39%), redside shiner (2%), and redband trout (3%).

Hatchery rainbow trout were the most common game fish sampled. A total of 85 rainbow trout were collected with the majority (87%) being relatively small, measuring from 140 to 220 mm. PSD estimates were incalculable as eight stock-length fish ($\geq$250 mm) and zero quality-length fish ($\geq$400 mm) were caught. Hatchery rainbow trout were in relatively poor condition.

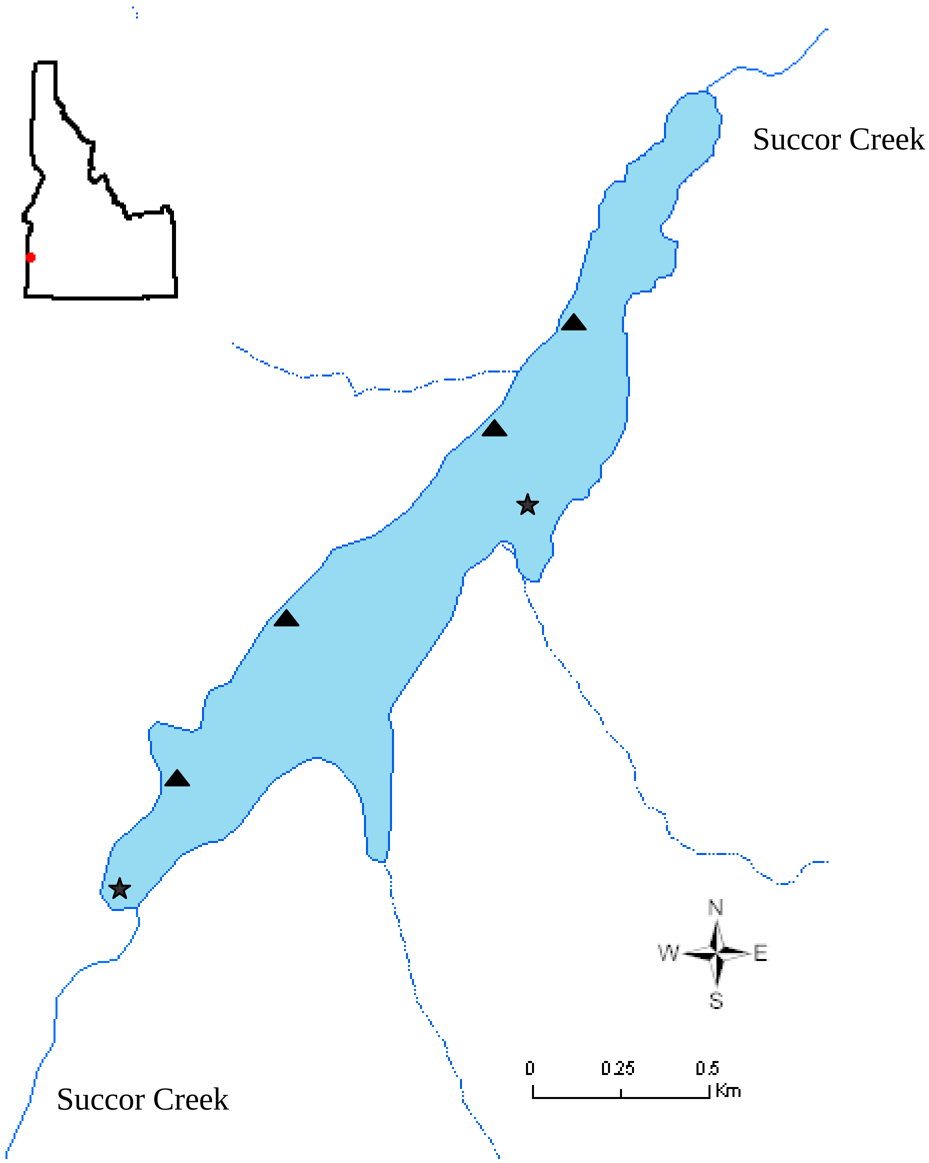


Figure 9. Map of Succor Creek Reservoir. Black stars show location of gill net pair sets, while black triangles show the location of trap net sets.

Table 5. Catch by species, effort, and catch per unit effort (CPUE) for the lowland lake survey conducted on Succor Creek Reservoir during 2007.

	Trap Net			Gill Net			Total	
	Catch	Effort	CPUE	Catch	Effort	CPUE	Catch	CPUE
Bridgelip sucker	46	4	11.5	70	2	35	116	46.5
Hatchery rainbow trout	--	4	--	85	2	42.5	85	42.5
Redband trout	--	4	--	6	2	3	6	3
Redside shiner	--	4	--	15	2	7.5	15	7.5
Total	46	4	11.5	176	2	88	222	99.5

Table 6. Total weight by species (kg), effort, and weight per unit effort (WPUE) for the lowland lake survey conducted on Succor Creek Reservoir during 2007.

	Trap Net			Gill Net			Total	
	Total Weight	Effort	WPUE	Total Weight	Effort	WPUE	Total Weight	WPUE
Bridgelip sucker	4.7	4.0	1.2	8.1	2.0	4.1	12.8	5.2
Hatchery rainbow trout	--	4.0	--	7.3	2.0	3.7	7.3	3.7
Redband trout	--	4.0	--	0.4	2.0	0.2	0.4	0.2
Redside shiner	--	4.0	--	0.5	2.0	0.3	0.5	0.3
Total	4.7	4.0	1.2	16.4	2.0	8.2	21.0	9.3

Hatchery rainbow trout were the most common game fish sampled. A total of 85 rainbow trout were collected with the majority (87%) being relatively small, measuring from 140 to 220 mm. PSD estimates were incalculable as eight stock-length fish (≥250 mm) and zero quality-length fish (≥400 mm) were caught. Hatchery rainbow trout were in relatively poor condition. Mean Wr equaled 90 (± 2.2) and showed a declining trend with length (slope = -0.05; $P = 0.04$). Only six redband trout were captured and they ranged from 165 to 244 mm. Redband trout were in similarly poor condition with a mean Wr of 82 (± 6.9).

Succor Creek Reservoir was sampled initially during 1980. Thirty-one redband trout averaging 327 mm were caught in two, 100' gill nets (Reid and Anderson 1981). Fish body condition was reported to be excellent. The first standardized sampling efforts were conducted during 1996 and utilized gill net pairs and trap nets (Allen et al. 1999) and then again during 2000 (Flatter et al. 2003). Comparison of gill net catches offers the best opportunity for comparing fish populations across these two studies and the present effort as trap nets have not been as efficient. Based on gill net CPUE, bridgelip sucker populations have remained fairly stable over the last 11 years (Figure 10). The percentage of hatchery trout in the catch has increased across this time period. Redband trout populations were initially low during the 1996 survey, possibly still recovering in numbers after dewatering of the reservoir during 1991 (Holubetz et al. 1994) Since then, densities increased to a high of 21 redband trout per gill net pair per night during 2000, but have declined to low levels in 2007. Combining all trout types, 2007 had the highest catch of trout to date. However, the population is currently composed of mostly small hatchery rainbow trout and few redband trout or larger trout are present (Figure 11). The reduction in redband trout is likely due to drought effects leading to lowered recruitment from the creek into the reservoir and reduced survival rates in the reservoir due to low water levels and correspondingly poor water quality. The lack of older age classes of hatchery rainbow trout is due to inconsistent stocking practices and poor water quality. No rainbow trout were stocked during 2001, 2002, 2004, or 2005 thereby leading to the missing length groups seen in the length frequency plot. Improvement in the quality of this population and this fishery will require better water years and annual stocking.

MANAGEMENT RECOMMENDATION

1. Stock annually with 5,000 hatchery rainbow trout fingerlings.

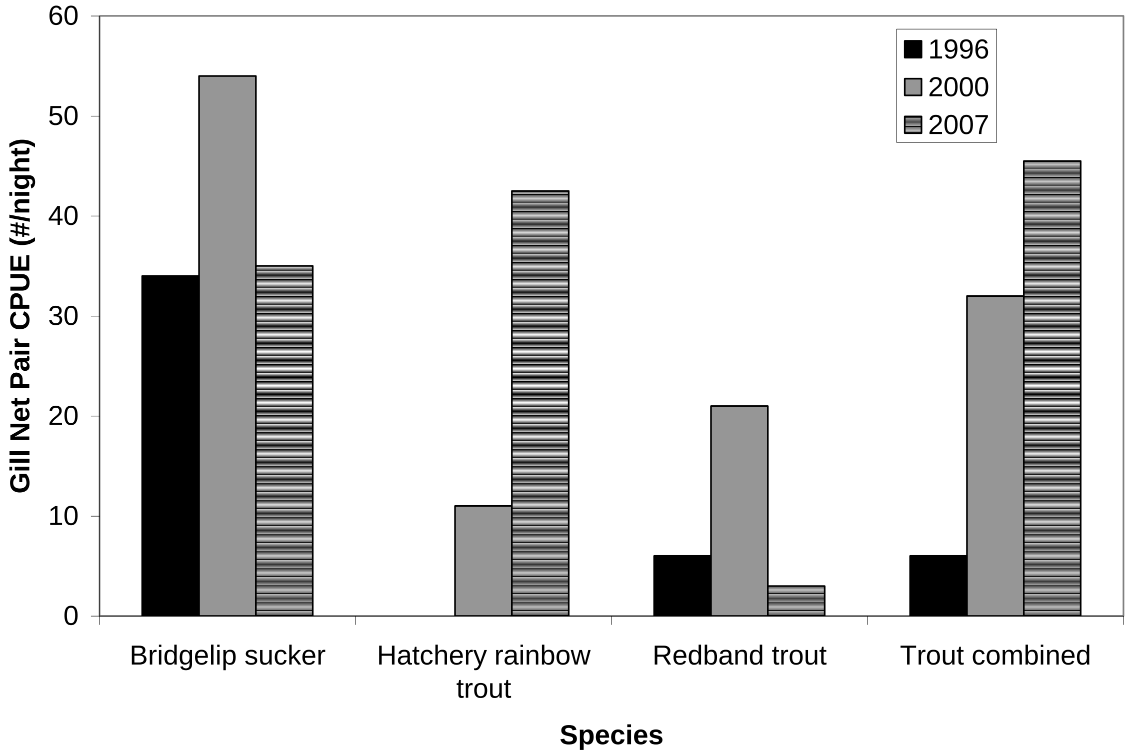


Figure 10. Gill net catch per unit effort for standard lowland lake surveys conducted on Succor Creek Reservoir during 1996, 2000, and 2007.

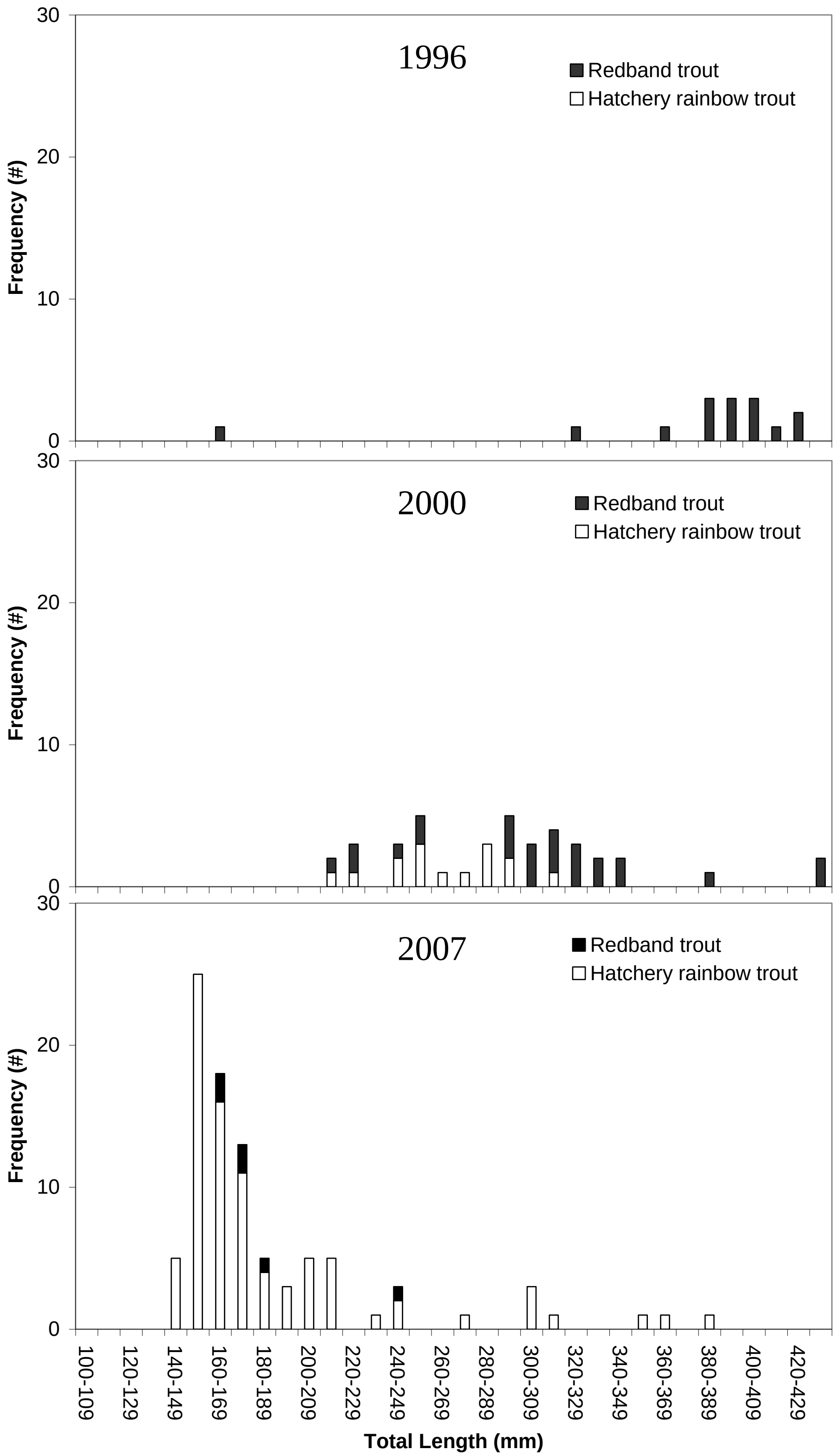


Figure 11. Length frequency of rainbow trout sampled from Succor Creek Reservoir during 1996 (top), 2000 (middle), and 2007 (bottom) standard lowland lake surveys.

2007 Southwest Region – Nampa Fishery Management Report

Deadwood Kokanee and Bull Trout Monitoring

ABSTRACT

In 2007 we operated weirs on tributaries to Deadwood Reservoir from early August through mid October. Weir operations served multiple purposes including; 1) limiting kokanee escapement on the main Deadwood River and tributaries upstream of the weir, 2) collect early spawning kokanee eggs for statewide kokanee management needs, 3) provide a capture point for evaluating population characteristics of the spawning kokanee population and, 4) capture bull trout to evaluate population characteristics. We captured over 130,000 kokanee and nine bull trout. Kokanee migration peaked on August 29 at the Deadwood River weir. Mean female kokanee size continued to decline for the fourth consecutive year to 252 mm.

INTRODUCTION

Over the last 10 years the kokanee population in Deadwood Reservoir has cycled drastically. Because kokanee exhibit density dependent growth, increases in population result in decreases in adult fish length. Mean female kokanee length observed at the kokanee spawning trap on the Deadwood River has varied from a low of 208 mm in 1992 to a high of 421 mm in 2003 with mean size decreasing since 2003. Deadwood Reservoir provides sport fishing for kokanee, rainbow trout and cutthroat trout. Bull trout are present in Deadwood Reservoir at very low numbers. Deadwood Reservoir also functions as one of the Idaho's primary egg sources providing early spawn kokanee for stocking throughout the state.

METHODS

Picket weirs capable of blocking fish passage were installed on Basin Creek, Beaver Creek, South Fork Beaver Creek, Deadwood River, and Trail Creek on August 13 and operated through October 15 to monitor bull trout and limit kokanee escapement. The Deadwood River downstream trap was installed September 12. The downstream traps on the tributary weirs were installed August 13. Weirs were constructed to trap both upstream and downstream migrating fish except on Basin Creek. Basin Creek had no upstream trap due to a high number of upstream migrating kokanee and close proximity to the Deadwood River weir. A number of females spawned for hatchery production were measured and had eggs counted to estimate length/fecundity relationships.

Weirs were checked one to two times daily for maintenance and fish handling. Kokanee captured at tributary weirs were culled and returned to the creek downstream from the weir. Kokanee captured at weirs were culled to regulate escapement in an attempt to reduce the density of kokanee in the reservoir in the future. Reducing density of kokanee should result in increased growth rates for the year class. Total lengths were recorded from a subset of kokanee captured at Trail Creek. Total length, weight, and passage direction were recorded for each bull trout captured (Table 7). Scales and fin clips were taken from each bull trout for age and genetic analysis. Bull trout captured during upstream migrations were tagged with Passive integrated transponder (PIT) tags. Fish captured in downstream traps during post-spawn periods were radio-tagged if a suitable size tag was available. Any bull trout recaptured with a radio tag was handled as little as possible.

Unknown numbers of fish escaped past weirs when they were breached due to storm events. Basin Creek was breached by storm events on September 1 and 23. Beaver Creek was breached due to storms on September 1, 19, 20, and 23. South Fork Beaver Creek was breached due to storms on September 1, 5, 20, and 23. Deadwood River was intentionally breached by removing pickets on September 22 to prevent damage to the structure from a sudden increase in flow from a storm. Trail Creek was breached on August 24 by a black bear *Ursus americanus* and again due to a storm event on September 23.

RESULTS AND DISCUSSION

Deadwood Reservoir

The Deadwood River weir trapped 110,095 kokanee in 2007 with the peak (13,804) occurring on August 29 (Figure 12). The total number of kokanee culled from all tributary weirs around Deadwood Reservoir totaled 136,453. The peaks for Trail Creek (3,475), Beaver Creek (145), and South Fork Beaver Creek (50) occurred August 28, August 24, and August 28 respectively. Average kokanee lengths were 259 mm for males (n=306) and 252 mm for females (n=256; Figure 13). Average fecundity (n=12) was 313 eggs for females from 235 to 250 mm total length. Mean female kokanee length has declined for four consecutive years (Figure 14) and now we are substantially below the management goal of an average size of 325 mm for adult kokanee.

Nine individual bull trout were handled in 2007 at tributary weirs. Lengths ranged from 70 to 460 mm (Figure 15.) Only one bull trout was trapped during both upstream and downstream migrations (Table 7). Three bull trout mortalities were identified. Two mortalities were noted at the Trail Creek weir. One mortality was found in the downstream trap, the second mortality was a fish that had washed onto the face of the weir. The mortality identified on the Deadwood River was found downstream of the fish weir. The mortality was most likely caused by avian predation as the fish had been released upstream of the weir the day prior to being found.

Downstream traps also captured sculpin spp., redside shiners, mountain whitefish *Prosopium williamsoni*, longnose dace *Rhinichthys cataractae*, rainbow trout, and unidentified trout fry. Peak capture for trout fry from Trail Creek occurred September 23 (Figure 16). Peak capture for mountain whitefish from the Deadwood River occurred October 4 (Figures 17 and 18). Peak capture for rainbow trout in Basin Creek occurred September 26 and September 29 at Trail Creek (Figure 16).

MANAGEMENT RECOMMENDATION

1. Operate weirs for at least one more year to determine feasibility of controlling kokanee by limiting spawning escapement.

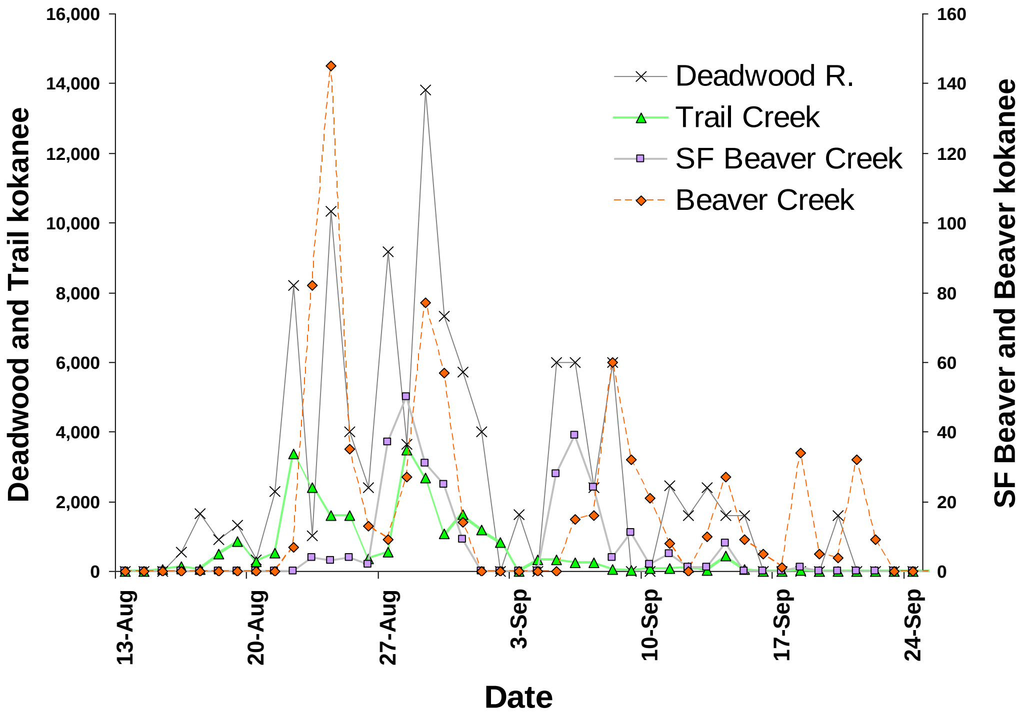


Figure 12. Adult kokanee captured at Deadwood River, Trail Creek, South Fork (SF) Beaver Creek, and Beaver Creek weirs in 2007.

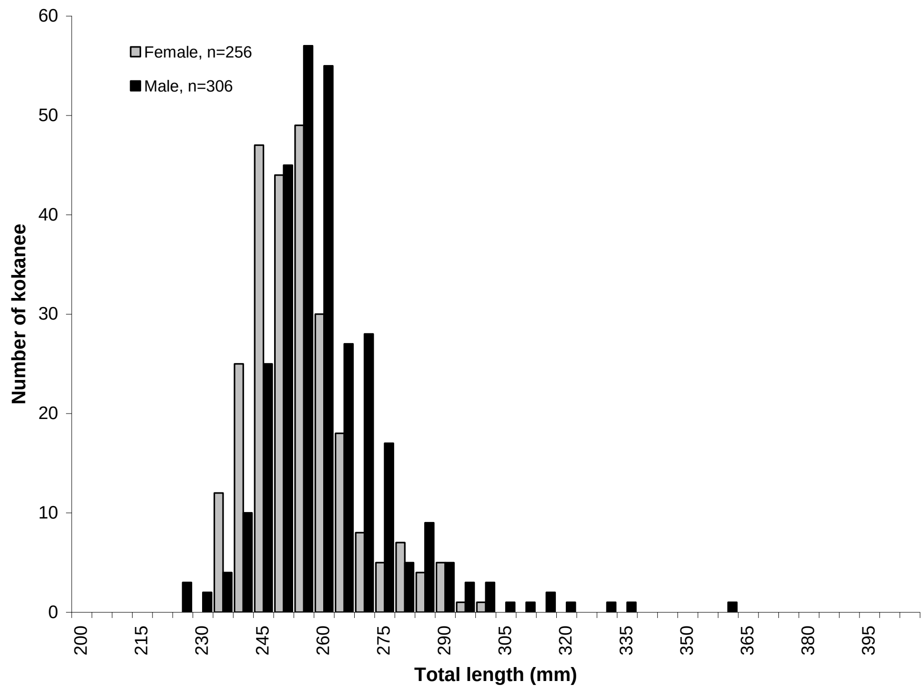


Figure 13. Length frequency of kokanee (n=562) measured at the Trail Creek kokanee weir during 2007.

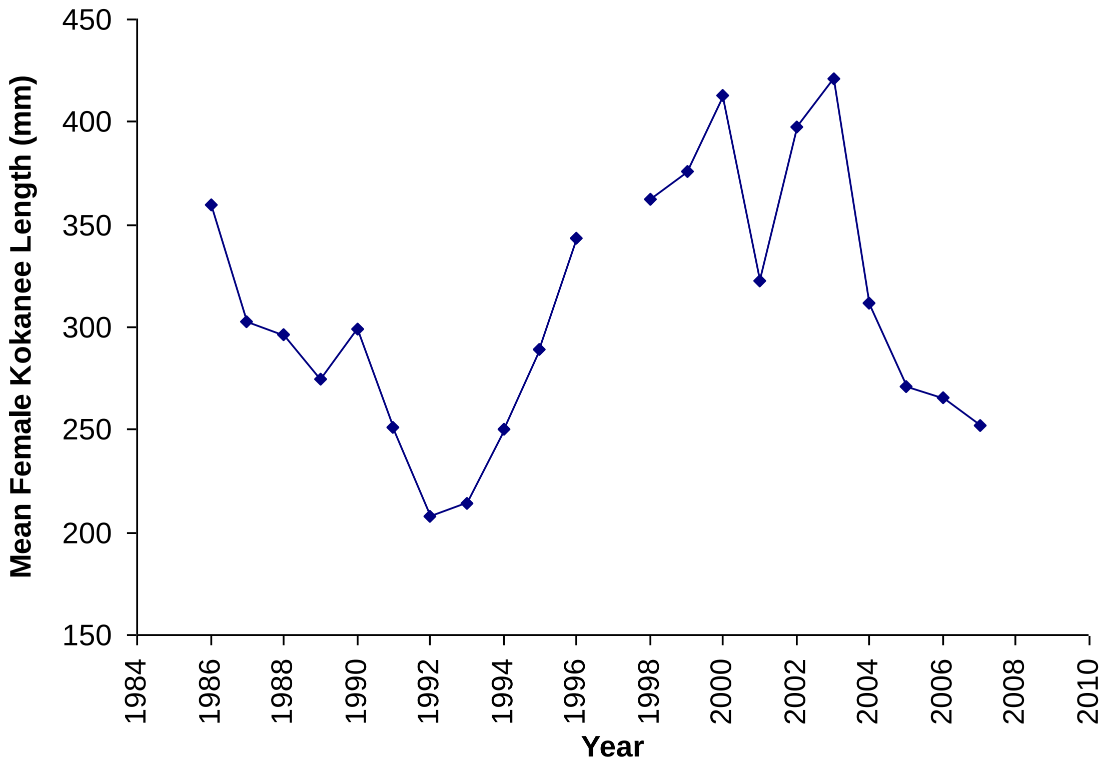


Figure 14. Mean female kokanee length from 1984 to 2008 for fish trapped during spawning at the Deadwood River weir.

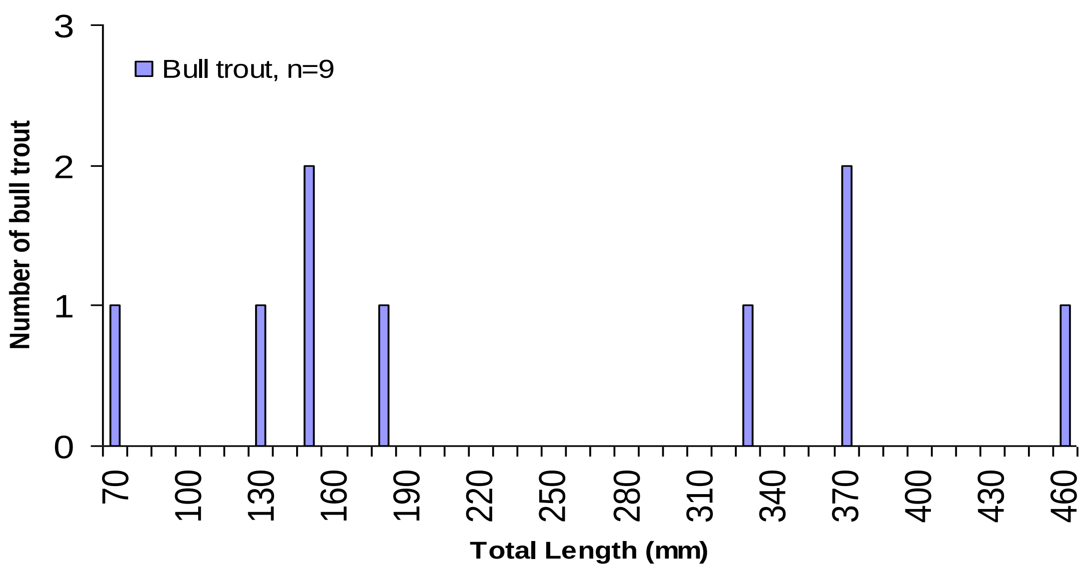


Figure 15. Length Frequency of bull trout trapped on Deadwood Reservoir tributaries in 2007. Length groups are in 10 mm increments.

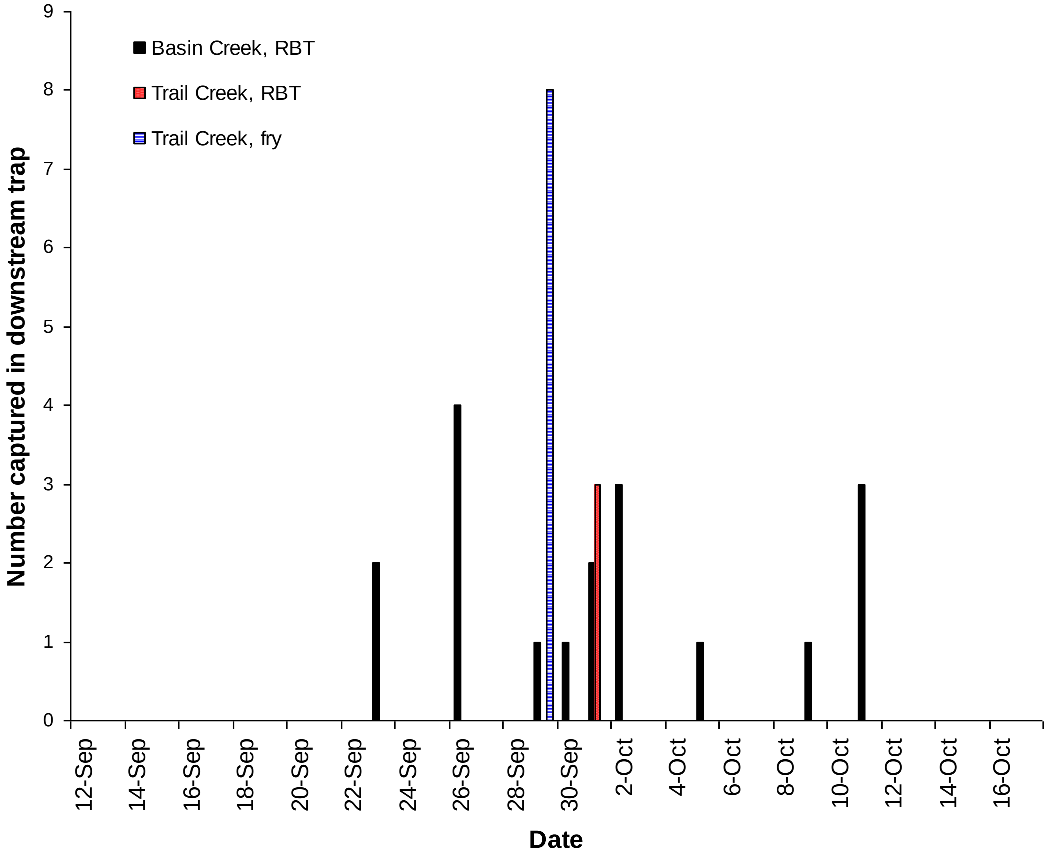


Figure 16. Daily downstream trout activity for Basin Creek and Trail Creek.

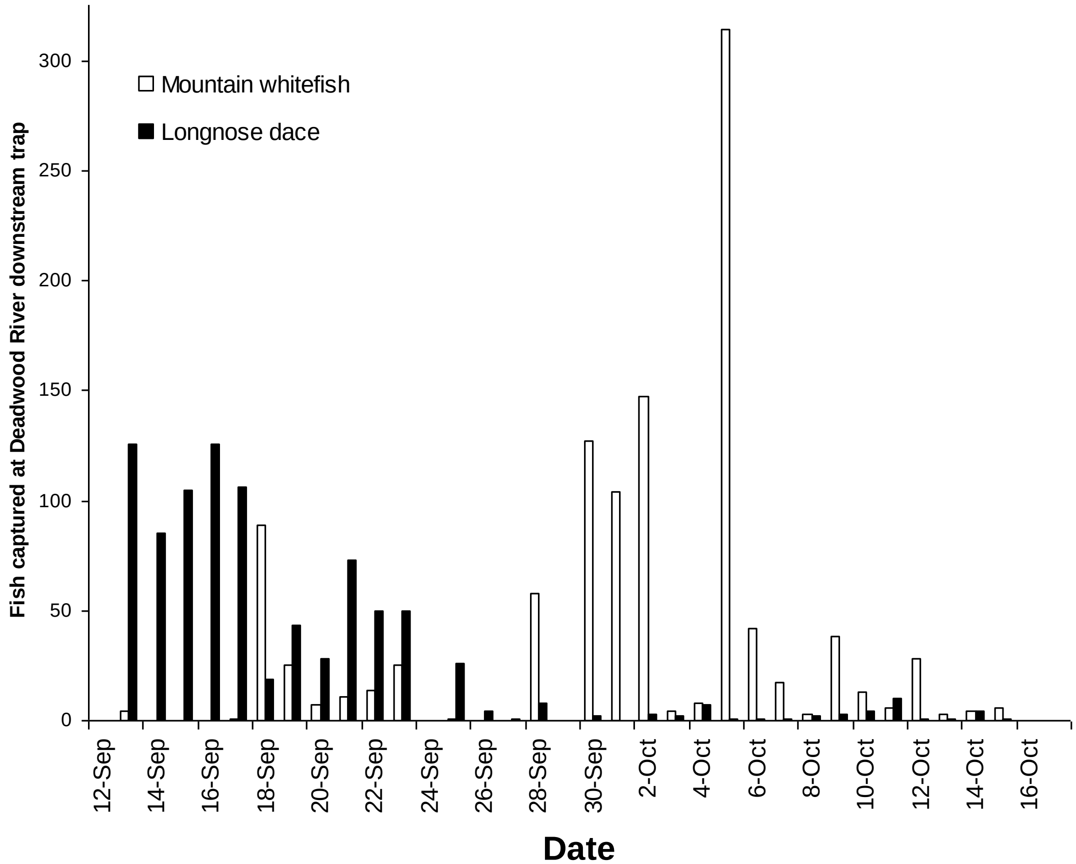


Figure 17. Deadwood River downstream trap for mountain whitefish and longnose dace operating from September 12 to October 15, 2007.

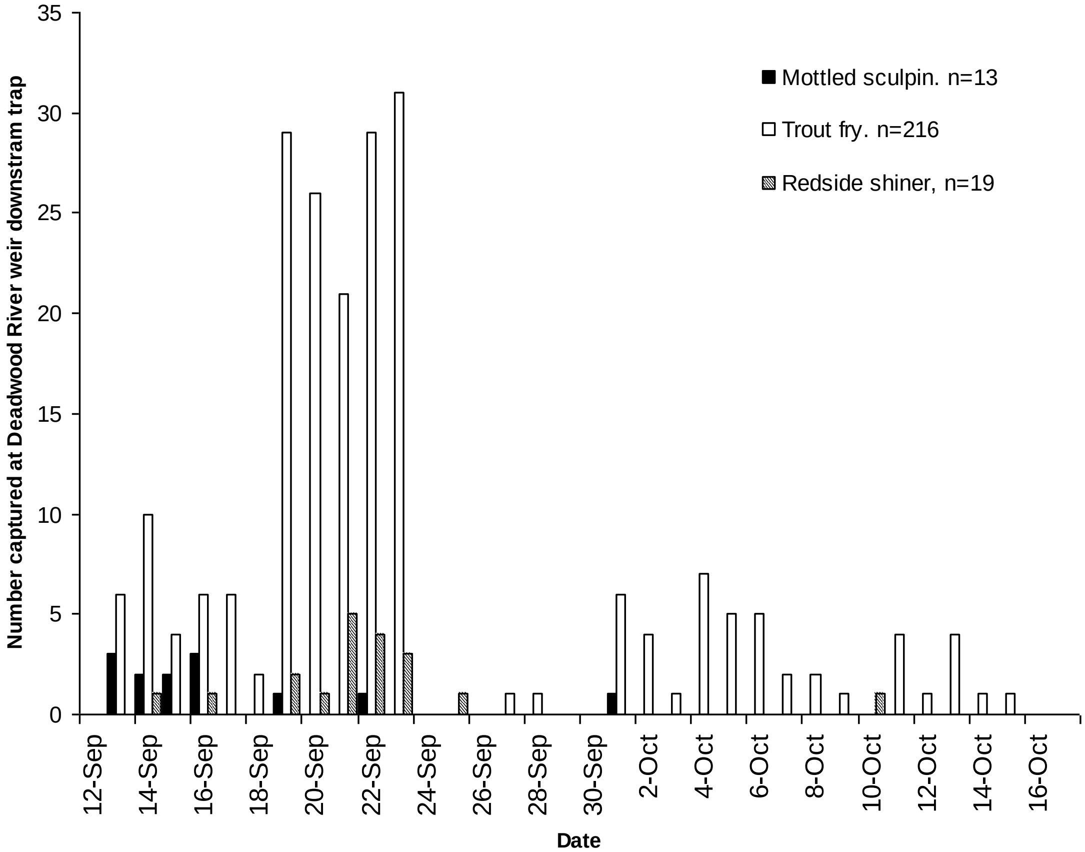


Figure 18. Numbers and dates of trapping for mottled sculpin, *Oncorhynchus spp*. fry (fry) and redside shiners captured at the Deadwood River downstream trap.

Table 7. Bull trout handled at tributary weirs on Deadwood Reservoir. Direction indicates migration direction of the fish when intercepted, PIT= passive integrated transponder.

Date	Total length (mm)	Weight (g)	Direction	PIT tag #	Comments
			Basin Creek		
9/29	175	48	down	4578267239	
10/3			down		escaped prior to tagging
			Beaver Creek		
8/13			up	4579384802	escaped prior to measuring
10/2	150		down		escape prior to tagging
			South Fork Beaver		
9/30	70		down		not tagged
			Trail Creek		
8/16	366	446	up	45781E0E4D	
8/16	368	396	up	45780A0E2D	
8/30	150		down		mortality on weir
9/30	130		down		mort in downstream trap
10/1			down		radio tagged BT released
			Deadwood River		
8/17			up	45784A417E	Radio Tag recapture-
8/18				45784A417E	mort recaptured downstream from weir
8/27	323	272	up	45771F7D0F	
9/18			down	45771F7D0F	recapture
9/24	460	960	down	4578086B09	Radio Tag code 22 Channel 3

HIGH MOUNTAIN LAKE SURVEYS

ABSTRACT

We conducted fish, amphibian, angler use, and habitat surveys on five mountain lakes in the Southwest Region during 2007. Lakes were located near the divide between the upper Deadwood River and Elk Creek drainages as well as near Trinity Peak in the Middle Fork Roaring River drainage. Porter Creek Lake #1 is a shallow lake with an average depth of one meter and is incapable of supporting fish populations, but Columbia spotted frog *Rana luteiventris* larvae and adults were numerous, as well as long-toed salamander *Ambystoma macrodactylum* larvae. Porter Creek Lake #2 is also incapable of supporting fish, but possesses abundant Columbia spotted frog, western toad *Bufo boreas*, and long-toed salamanders were observed mostly in the sub-adult and larval stages. Pilgrim Mountain Lake was similarly shallow and incapable of supporting fish populations. Columbia spotted frog and larval long-toed salamander were present. In Twin Sisters Lake #1, no fish were collected with one net set overnight, despite fish being stocked in the lake during odd years since at least 1999. Columbian spotted frog, western toad, and long-toed salamander were observed during the amphibian survey. In Twin Sister Lake #2, an over-night gill net set yielded 14 rainbow trout ranging in length from 229 to 380 mm. Based on length, the absence of fry or fingerlings, and inadequate spawning habitat, these fish were remnants of 1,000 rainbow trout fry stocked during 2003 and 2005. Overall use of the lake appears to be low.

OBJECTIVES

1. To describe the distribution, relative abundance, and species composition of fish and amphibian populations in high mountain lakes of the Southwest Region.

2. Assess factors affecting the distribution, relative abundance, and species composition of fish and amphibian populations in high mountain lakes including stocking strategies, habitat characteristics, and human use.

3. Alter stocking strategies to reduce risk to native fish and amphibian populations, while maintaining quality fishing opportunities.

INTRODUCTION

We conducted surveys on five mountain lakes in the Southwest Region during 2007. Lakes were located near the divide between the upper Deadwood River and Elk Creek drainages as well as near Trinity Peak in the Middle Fork Roaring River drainage. Surveys were conducted between July 25 and August 6. These lakes were selected as they have not been surveyed recently. Porter and Pilgrim lakes have not been stocked recently, if ever, whereas Twins Sisters lakes have been stocked with rainbow trout during odd years since 1999. We attempted to sample all lentic habitats that appeared on 1:24,000 topographical maps or on aerial photos (Figures 19 and 20).

METHODS

In stocked lakes or lakes presumably capable of supporting fish, we set Swedish type experimental gill nets. Nets measured 46 m long by 1.5 m deep, with 19, 25, 30, 33, 38, and 48 mm bar mesh panels. One unit of gill net sampling effort was defined as one gill net fished overnight. Hook-and-line angling effort was expended when possible. One unit of angling effort was defined as one hour of active fishing. All fish captured were identified to species, measured for total length (mm), and weighed (g).

Basic limnological and morphological measurements were collected at lakes where fish surveys were conducted. To determine average depth, lake width measurements were taken at ¼, ½, and ¾ distances along the long axis of each lake using a laser rangefinder (Bushnell Yardage-Pro). Cross-sectional depth measurements were taken at 3 points along each of the width measurement transects using a hand held sonar (Strikemaster Polar Vision), resulting in nine total depth measurements for each lake surveyed. Mean depth was calculated as the average of the nine depth measurements. Surface water temperatures were recorded along the lake shoreline at one point. Spawning potential was determined visually by assessing the presence and quality of substrate, flow, and gradient, in associated inlets and outlets to each lake. For lakes presumably incapable of supporting fish populations, partial surveys were conducted to assess amphibian populations and human use.

Amphibian surveys were conducted by walking the perimeter of each lake. Species, abundance, and life stages of all observed amphibians were recorded. Logs and other structure in or adjacent to the lake were moved in efforts to detect hidden amphibians. Amphibian life stages were recorded as adult, sub-adult, larval, or egg mass.

Human use of mountain lakes was evaluated based on general appearance of use, number and condition of campsites, number of fire rings, access trail condition and difficulty, and presence of litter. General levels of human use were categorized as rare, low, moderate, and high based on overall visual assessment by IDFG personnel.

RESULTS AND DISCUSSION

Porter Creek Lake #1 is a 0.3 ha lake that lies at 2,312 m elevation and is surrounded by a narrow ring of marsh type habitat and transitions to terrestrial forest. It is a shallow lake with an average depth of 1 m and is incapable of supporting fish populations. Columbia spotted frog larvae and adults were abundant. Additionally long-toed salamander larvae were seen around downed timber in the lake. There were no signs of human use at this lake.

Porter Creek Lake #2 is a 0.1 ha lake that lies at 2,424 m elevation near the edge of a large grassy meadow. It is a shallow lake with a maximum depth of only 0.75 m. It is incapable of supporting fish. Columbia spotted frog, western toad, and long-toed salamanders were observed mostly in the sub-adult and larval stages. Human use seemed limited to horse packers.

Pilgrim Mountain Lake is a 0.7 ha lake that lies at 2,207 m elevation on a heavily forested steep hillside. It possesses an average depth of 1 m and appears incapable of supporting fish. Columbia spotted frog and larval long-toed salamander were present. There were no signs of human use at this lake.

Twin Sisters Lake #1 is a 0.6 ha lake that lies at 2,439 m elevation. No depth information was collected; however, it appeared deep enough to allow trout to survive the winter. No fish were collected with one net set overnight, despite fish being stocked in the lake during odd years since at least 1999. Columbian spotted frog, western toad, and long-toed salamander were observed during the amphibian survey. There were no signs of human use at this lake.

Twin Sister Lake #2 is a 1.6 ha lake that lies at 2,421 and its shoreline consists of rock and forest. An over-night gill net set yielded 14 rainbow trout ranging in length from 229 to 380 mm (Figure 21). Based on length, the absence of fry or fingerlings, and inadequate spawning habitat, these fish were remnants of 1,000 rainbow trout fry stocked during 2003 and 2005. Relative weights averaged 86 ± 5 with the 2003 year class appearing to be in poorer condition. No amphibians were observed during surveys. Overall human use of the lake appears to be low.

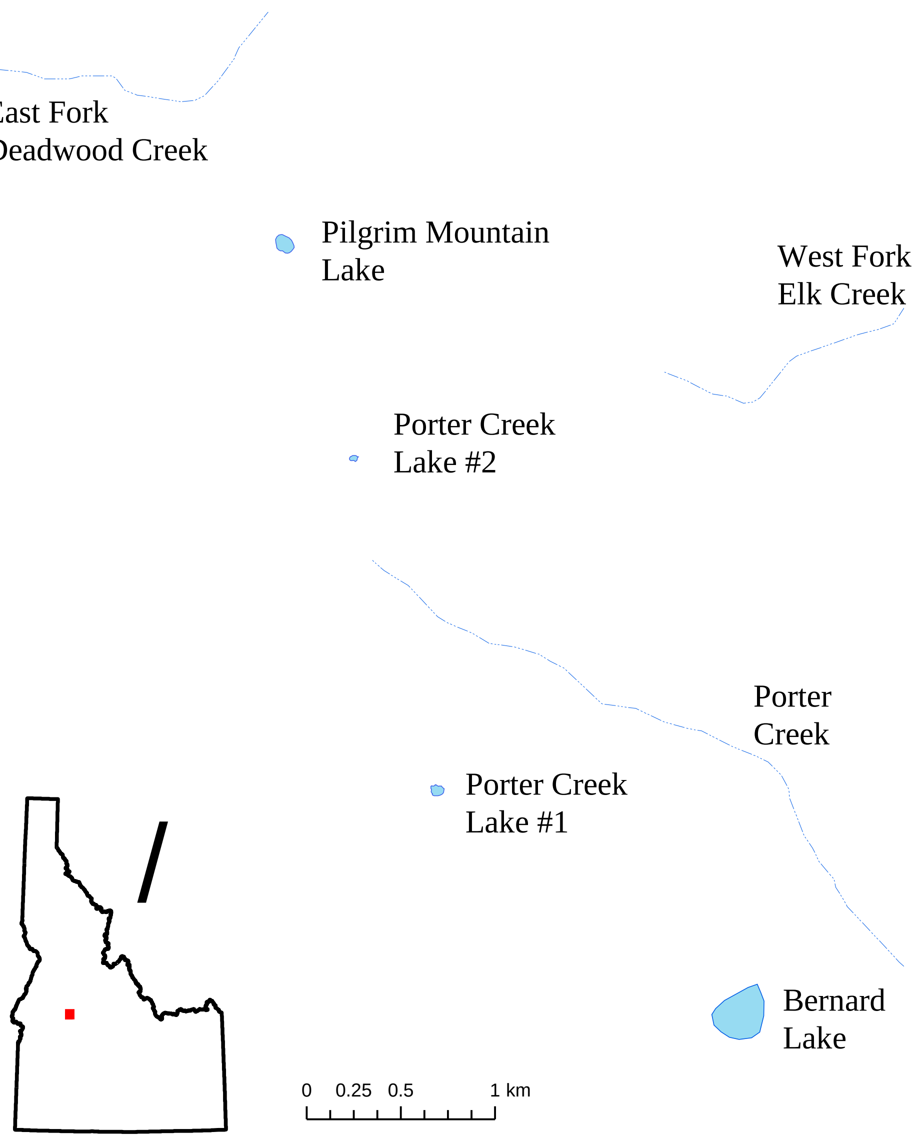


Figure 19. Map of three lakes sampled during 2007 near Pilgrim Mountain, Valley County, Idaho.

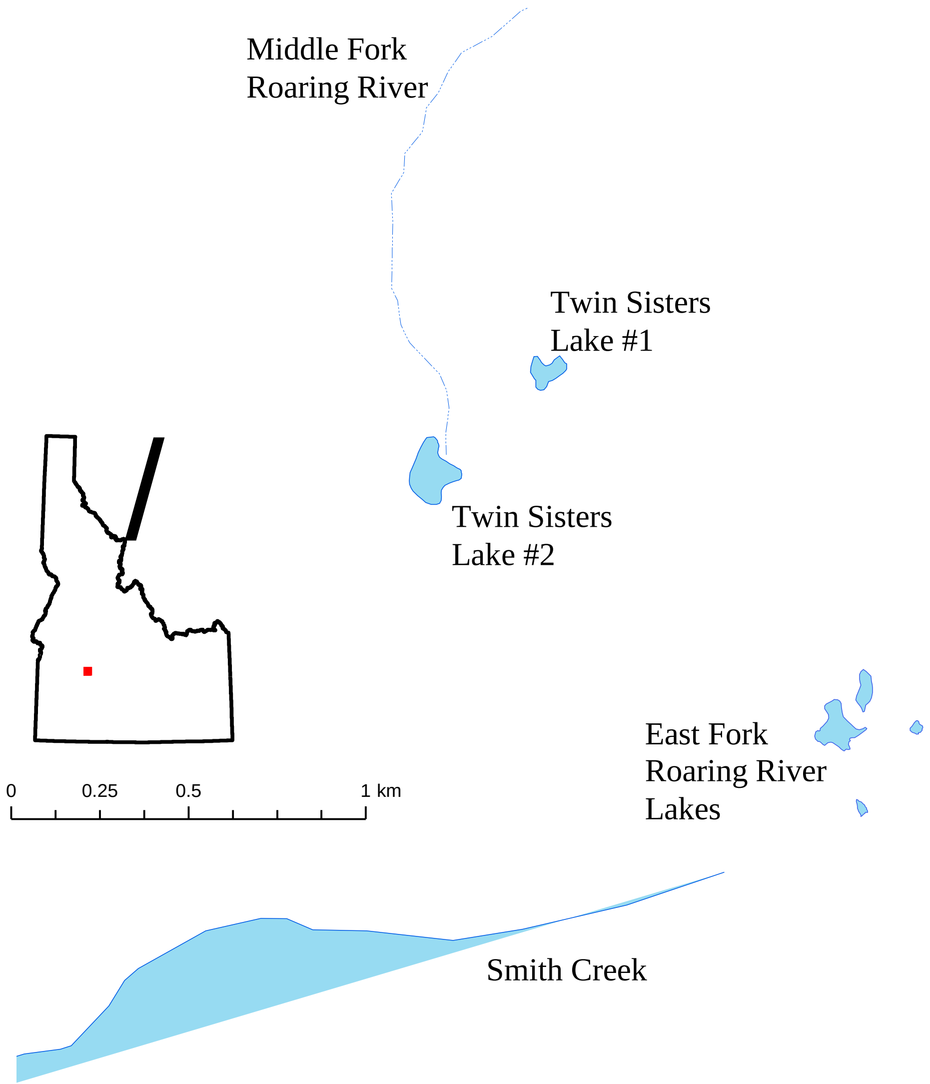
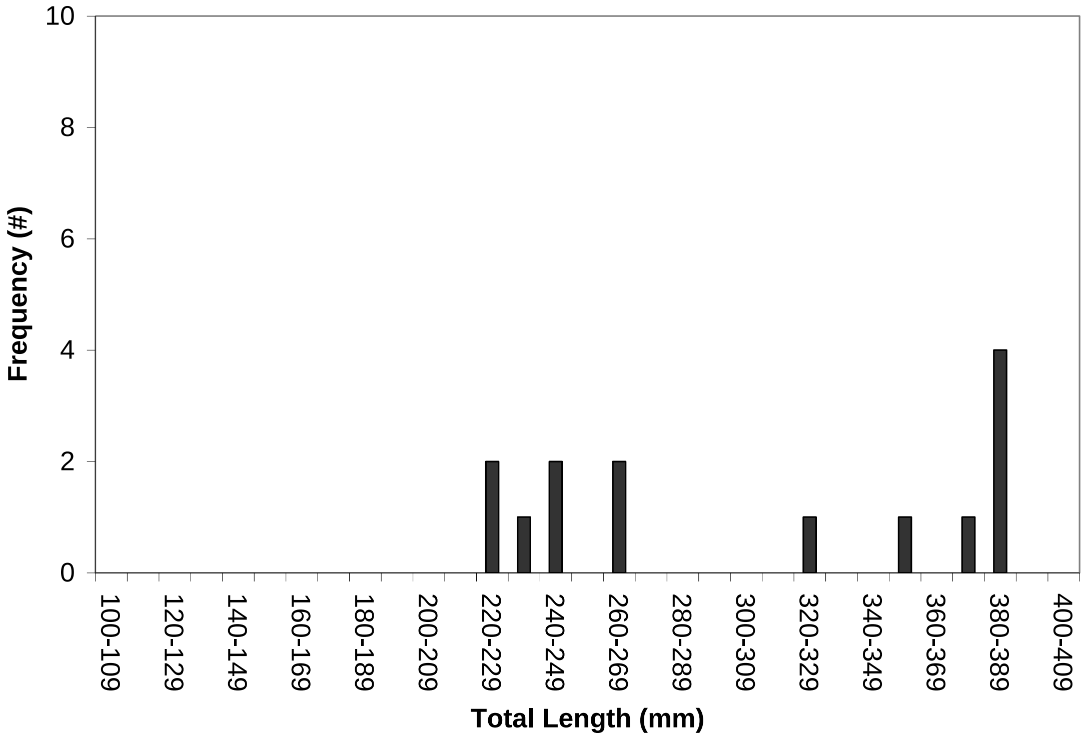


Figure 20. Map of lakes sampled during 2007 near Trinity Mountain, Elmore County, Idaho.

Figure 21. Length frequency of rainbow trout sampled in Twin Sisters Lake #2 during 2007.



MANAGEMENT RECOMMENDATIONS

1. Continue to manage Porter Creek lakes #1 and #2 as well as Pilgrim Mountain Lake as fishless lakes to conserve amphibian populations.

2. Remove Twin Sisters Lake #1 from the stocking rotation as past stocking efforts have not established fishable populations.

3. Maintain currents stocking rotation and densities in Twin Sisters Lake #2.

2007 Southwest Region – Nampa Fishery Management Report

Rivers and Stream Sampling

ABSTRACT

The 2007 Southwest Region rivers and stream sampling included Chinook salmon redd counts, fish community assessments on the Snake River from C.J. Strike Dam to Swan Falls Reservoir, a year-long creel survey of white sturgeon anglers on the Snake River from C.J. Strike Dam to Grandview Bridge, and a trout and mountain whitefish population survey on the lower Boise River in Boise. Observers counted 189 redds in 11 trend transects. The fish community in the Snake River between C.J. Strike Dam and Swan Falls Reservoir was dominated by non-game fish, primarily largescale sucker. Smallmouth bass were the most numerous game fish. White sturgeon creel survey results through 2007 found catch rates of 0.063 fish/hour with monthly effort averaging 2,931 hours. Surveys on the lower Boise River in 2007 found 216 brown trout/km, 1,253 wild rainbow trout/km and 3,131 mountain whitefish/km.

Salmon River Drainage Chinook salmon Redd Counts

INTRODUCTION

Tributaries of the upper Middle Fork Salmon River, including Bear Valley, Elk, and Sulphur creeks possess some of the best remaining spring/summer Chinook salmon *Oncorhynchus tshawytscha* spawning habitat in the Snake River basin. IDFG has conducted annual spawning ground surveys on these systems since 1957 to enumerate the number of Chinook salmon redds as an index of adult population abundance. Initially, surveys were conducted along fairly long transects (6-8 km) using aerial counts or on foot; however, beginning in about 1989, transects were split into shorter segments (3-4 km) and have been surveyed on foot annually during the last week of August (Hassemer 1993). In 2007, 189 redds were counted in the three monitoring streams and 11 trend monitoring transects, combined. This total is a notable increase of 72% over the 2006 count of 110 redds. Despite this increase, total redd counts in this area are still much lower than the high of 1,440 redds counted across these streams in 1957 and the consistently high counts document during the 1960s.

Despite the abundance of high quality spawning and juvenile rearing habitat, overall numbers of wild Chinook salmon have declined precipitously from highs observed during the late 1950 and 1960s. This led to federal listing of Snake River Chinook salmon as threatened under the Endangered Species Act during April 1992. Since then, returning adult abundances have remained critically low, except for a three year period from 2001-2003, when adult numbers rebounded temporarily. During 2004-05, this trend reversed, and adult abundances returned to near historical low levels of the late 1990s.

OBJECTIVES

1. To index the abundance of returning wild adult Chinook salmon by counting redds within historical trend monitoring transects in Bear Valley, Elk, and Sulphur creeks during 2007.

2. To compare current redd count information to historical data.

METHODS

Spawning ground surveys were conducted along 11 historical trend monitoring transects in Bear Valley, Elk, and Sulphur creeks (Figure 19) from August 28 thru September 18, 2007. The timing of surveys conducted along Bear Valley and Elk creeks occurred within the interval of past sampling dates. Surveys conducted along Sulphur Creek occurred about three weeks later than normal due to nearby large forest fires.

All surveying techniques followed the protocol outlined by Hassemer (1992). Prior to conducting surveys, surveyors were required to attend an IDFG sponsored training session taught by experienced biologists. Afterwards, pairs of surveyors walked upstream through each transect. After locating a prospective redd site, surveyors determined and recorded whether the location was a single redd, multiple redds, or a test dig. The location was documented with a hand-held global positioning system. For each site, surveyors also recorded the number of live and dead adult Chinook salmon observed, as well as their age and sex. Biological samples were collected from salmon carcasses and provided to the Idaho Natural Production Monitoring and Evaluation Project.

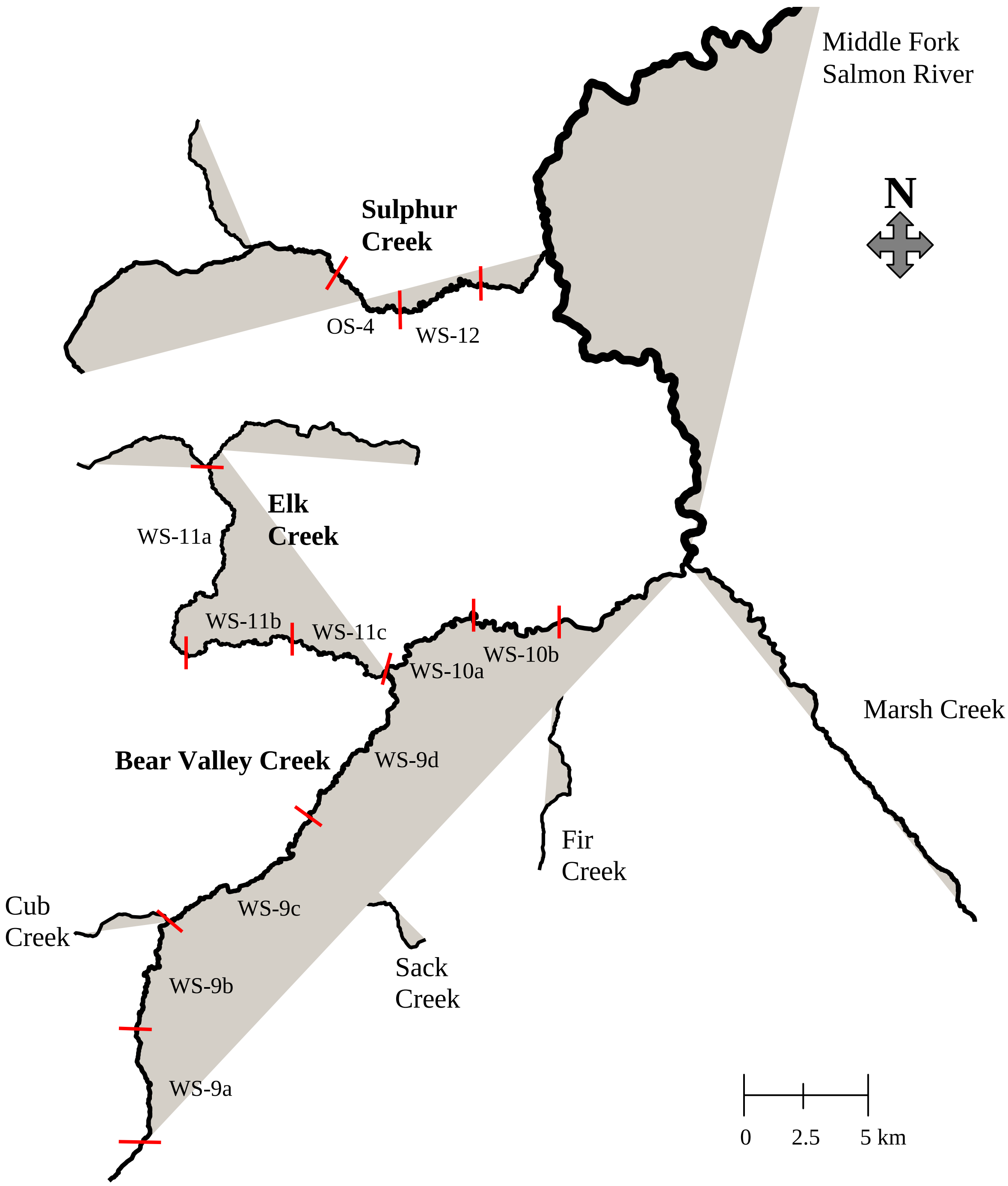


Figure 19. Location of 11 redd count trend transects on Bear Valley, Elk, and, Sulphur creeks used to index the abundance of wild spring/summer-run Chinook Salmon in the upper Middle Fork Salmon River Drainage, ID. Red lines denote transect boundaries.

RESULTS AND DISCUSSION

A total of 75 redds were counted along six transects in Bear Valley Creek. Overall, this represents a 142% increase from 2006 (31 redds), but represents a 79% decline when compared to a recent high redd counts from 2003 (364 redds) and a 89% decline from the highest count ever noted during 1961 counts (675 redds; Figures 20, 21 and 22). In Bear Valley Creek, redds were concentrated in the two sites (WS-9d and WS-10a) adjacent to the mouth of Elk Creek. Thirty-three redds were counted within each of these sites. No fish were counted along one transect: WS-9a, the uppermost transect in Bear Valley Creek. One and two redds were counted in WS-9b and WS-10b, respectively. Transects WS-9a and WS-9b seem to offer less than optimal spawning habitat and counts in these transects have often been very low (only exceeding 25-30 redds during peak escapement years). Six redds were counted in WS-9c.

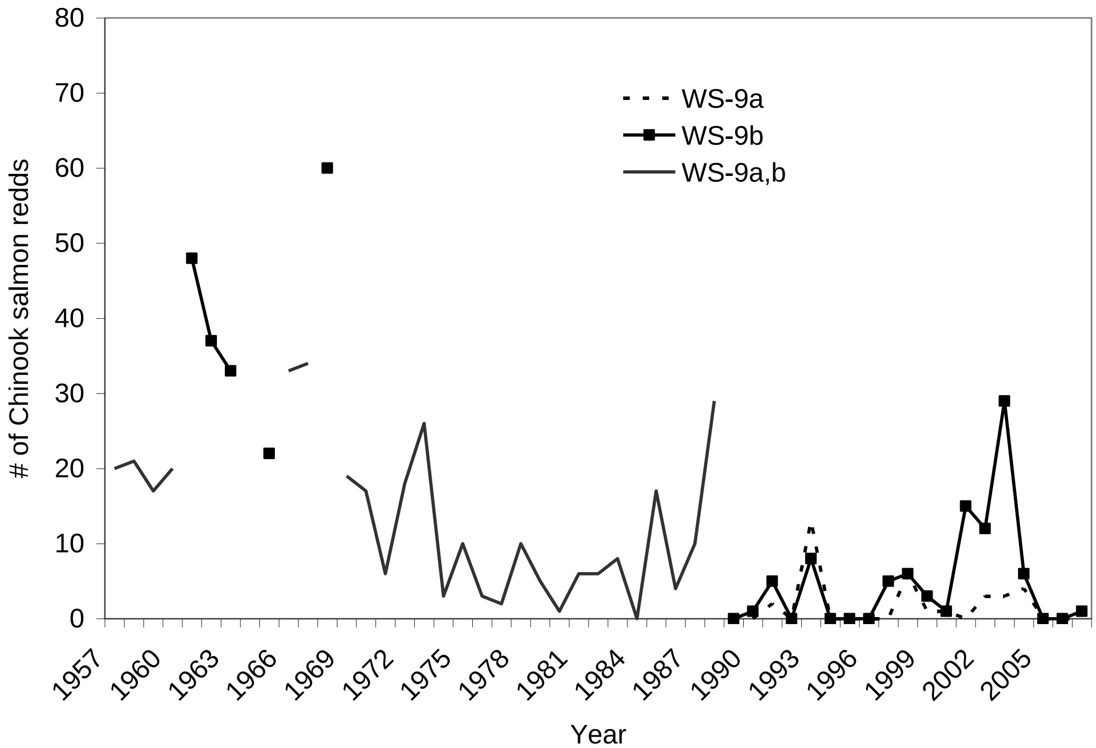


Figure 20. Number of Chinook salmon redds counted along upper Bear Valley Creek index transects from 1957-2007. The solid line represents a cumulative count for WS-9a & b that was monitored in most years from 1957 to 1989.

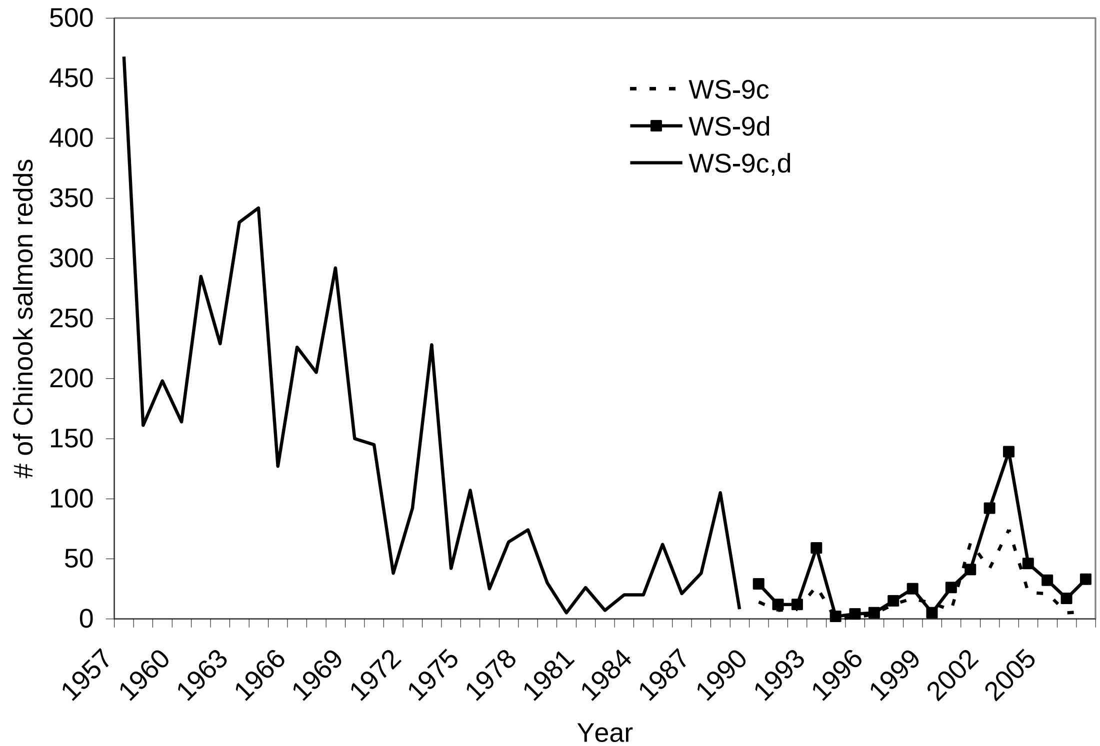


Figure 21. Number of Chinook salmon redds counted along middle Bear Valley Cr. index transects from 1957-2007. The solid line represents cumulative counts for WS-9c & d.

A total of 88 redds were counted along three transects in Elk Creek during 2007 surveys. Similar to Bear Valley Creek, this represents an increase from 2006, but represents a decline from recent and historical highs (Figure 23). Overall, the 2007 count represents a 66% increase from 2006 (53 redds), a 77% decline from the recent high of 2002 (377 redds), and an 87% decline from the historical high of 1961 (654 redds). Redds were concentrated in the two most upstream monitoring sites. The highest count (n = 44 redds) occurred in the most upstream transect, WS-11a. Whereas, 41 and 3 redds were counted in the middle (WS-11b) and lower (WS-11c) transects along Elk Creek.

A total of 26 redds were counted along two transects in Sulphur Creek during 2007 surveys. In contrast to Bear Valley and Elk creeks, counts for Sulphur Creek were very similar to 2006 counts. However, 2007 redd counts were still much lower than recent and historical highs (Figure 24). Overall for Sulphur Creek transects, the 2007 count (26 redds) represented a 4% increase from 2006 (25 redds), but represents a 72% decline from the recent high of 2002 (93 redds), and a 94% decline (only comparing WS-12, 21 redds in 2007) from the historical high of 1957 (381 redds).

MANAGEMENT RECOMMENDATIONS

1. Continue to index the abundance of wild adult Chinook salmon by counting redds in Bear Valley, Elk, and Sulphur creeks.

2. Continue to pursue strategies that improve down river and ocean survival of stocks returning to the Middle Fork Salmon River drainage.

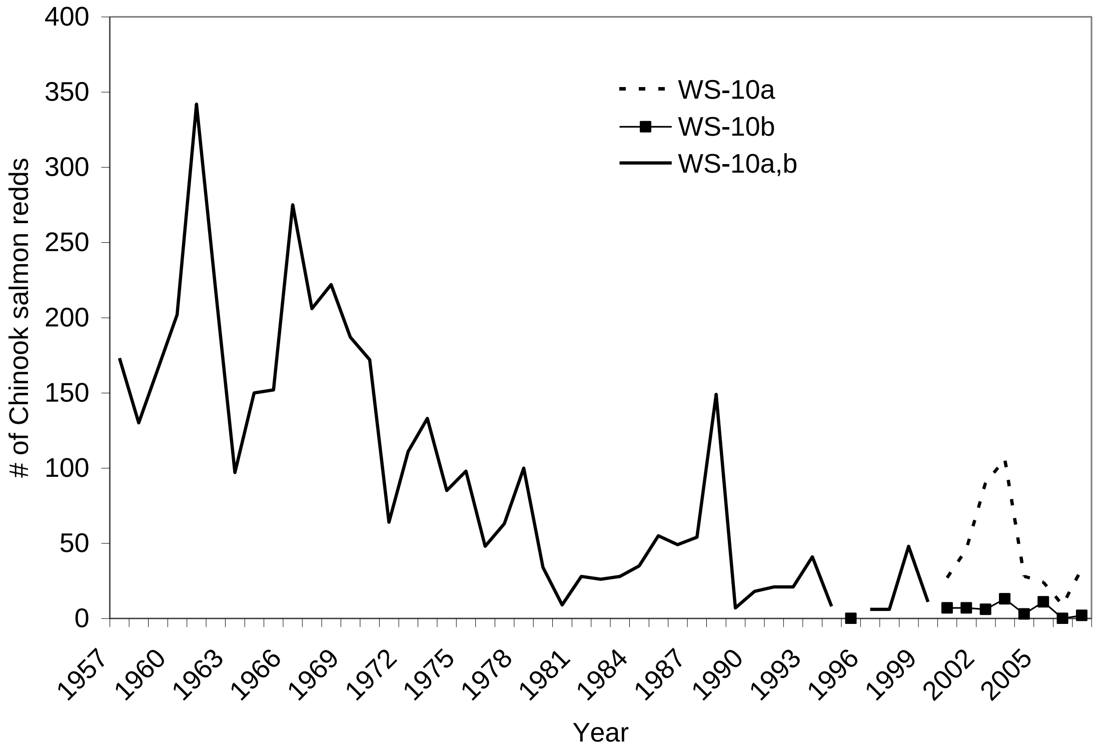


Figure 22. Number of Chinook salmon redds counted along lower Bear Valley Cr. index transects from 1957-2007. The solid line represents cumulative counts for WS-10a & b.

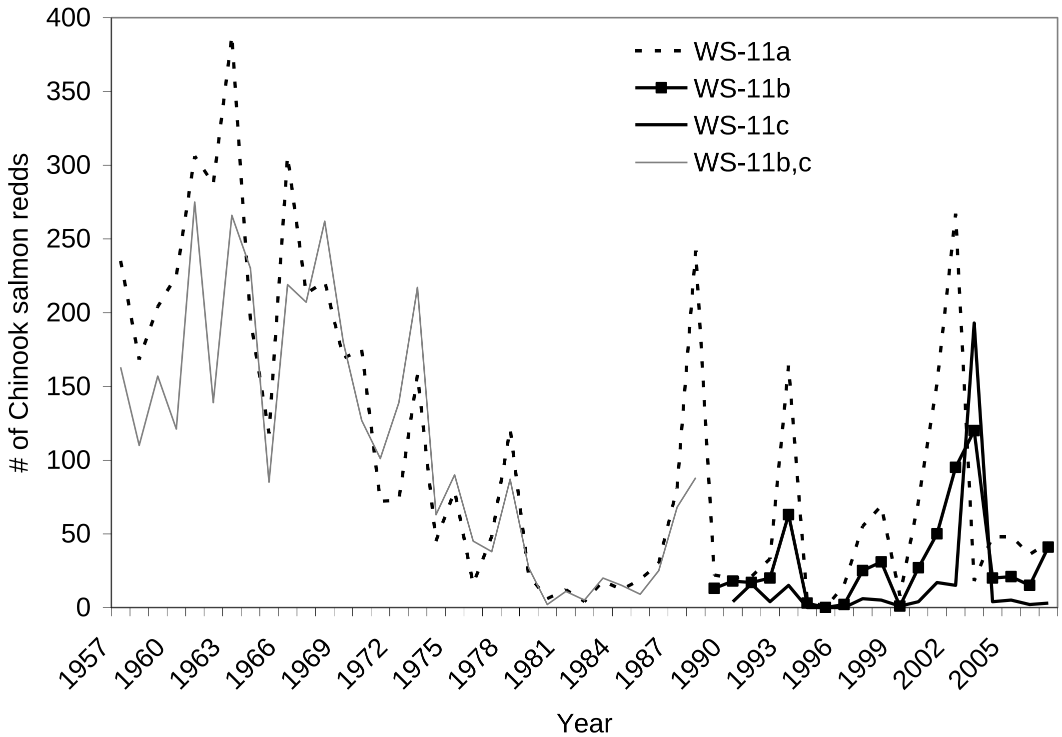


Figure 23. Number of Chinook salmon redds counted along Elk Creek index transects from 1957-2007. The light blue line represents a cumulative count for WS-11b and WS-11c, whereas all other lines represent individual transects.

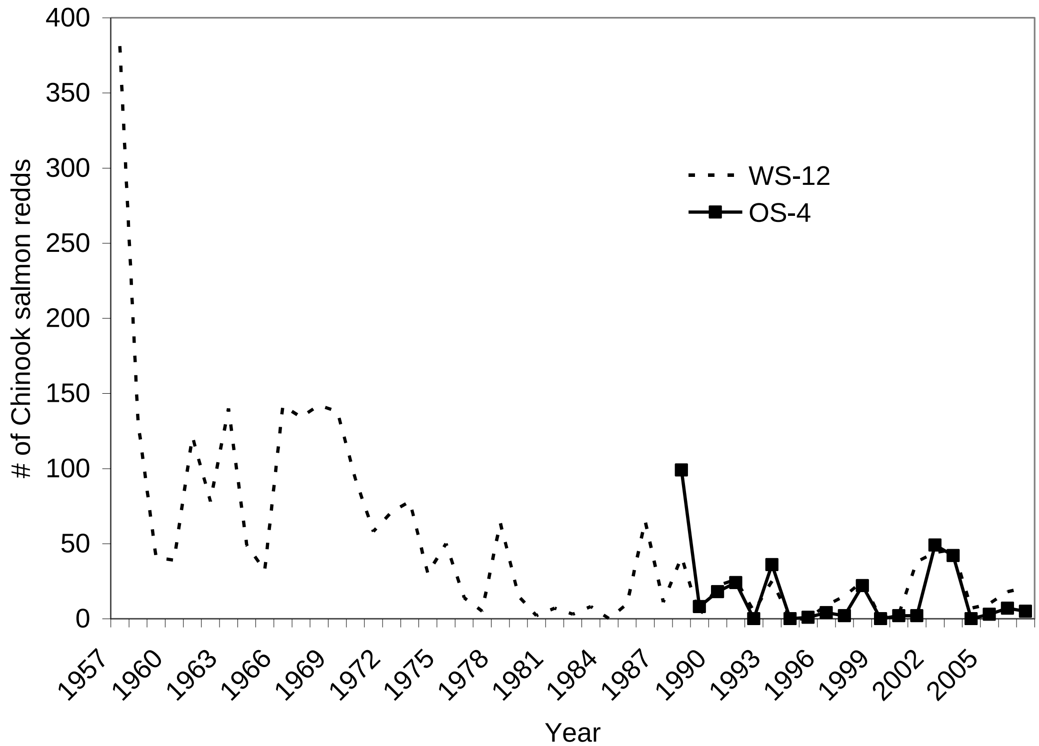


Figure 24. Number of Chinook salmon redds counted along Sulphur Creek index transects from 1957-2007.

Snake River Electrofishing Survey

INTRODUCTION

The segment of the Snake River from C.J. Strike Dam downstream to Swan Falls Dam provides nearby and diverse fishing opportunity for many Idaho anglers. Fishing effort is focused towards the upper and lower ends of this reach due to limited access in the middle portion within the Snake River Birds of Prey National Conservation Area. At the upper end, angling effort is primarily expended by bank anglers that target white sturgeon *Acipenser transmontanus*, rainbow trout, yellow perch, and crappie downstream of C.J. Strike Dam. At the lower end of this reach, most anglers target smallmouth bass in Swan Falls Reservoir and the lower Snake River from boats. The river between these areas is less frequently fished but jet boat anglers target smallmouth bass and white sturgeon in this section.

Limited fisheries or fish population data has been collected within this segment of the Snake River by IDFG or other agencies. Fish population surveys were completed by IDFG during the 1972 and 1973 (Reid et al. 1973; Gibson 1974) and again in 1995 (Allen et al. 1998). Since then, Idaho Power estimated that the white sturgeon population from Swan Falls to Walter's Ferry contained 725 individuals > 70 cm total length during 1996-1997 (Idaho Power Company 2003). A more recent survey has indicated that the white sturgeon population during 2005-2006 has declined to 566 individuals (Ken Lepla, Idaho Power Company, pers. comm.). Recently, concern has arisen that fishing pressure has increased on this segment of the Snake River due to the rapidly increasing human population in southwest Idaho. We initiated this monitoring effort to compare current fish populations to limited historical data and to establish trend monitoring sites so fish population trends may be tracked in the future.

OBJECTIVES

1. Establish monitoring sites in the Snake River from C.J. Strike Dam to Swan Falls Dam so that fish population trend data may be compared in future years from standard sites.

2. Describe the distribution, relative abundance, and composition of the fish community, excluding white sturgeon, of the Snake River from C.J. Strike Dam to Swan Falls Dam.

3. Compare current fish relative abundance, size structure, and species composition to historical sampling information collected during 1973 and 1995.

METHODS

C.J. Strike Dam, located at Snake River km 795 was the upstream boundary of the study area for 2007 sampling efforts, whereas Swan Falls Dam (km 737) was considered the downstream boundary. We non-randomly selected seven study sites within these 58 km (Figure 25). Preferentially selected sites that contained readily identifiable landmarks, possessed diverse habitat types, and that were well dispersed throughout the study area were also identified. These sites allowed relatively high catch rates for several species compared to simpler habitats in low gradient, shallow areas where electrofishing attempts were ineffective due to the abundance of macrophyte growth.

Fish capture was conducted using electrofishing gear mounted to an aluminum jet boat. Pulsed direct current was produced by a 5,000 watt generator. Frequency was set at 120 pulses per second and a pulse width of 40, which yielded an output of 5-8 amps. Electrofishing effort ranged from 2,149 to 6,743 seconds per sampling site with a mean effort of 4,108 seconds. Site length measured along the thalweg ranged from 610 to 1,410 m with a mean of 975 m. One netter positioned on the bow of the boat captured as many fish as possible, except common carp and largescale sucker. For these species, we attempted to collect ten individuals at each site and then counted the remainder without bringing them into the boat. At each site, one electrofishing pass was expended along or as near as possible to all river banks, including the banks of islands. Surveys were conducted from October 12 to 23 during daylight hours. During this period, mean daily river flow measured at the Nyssa gauging station ranged from 8,030 to 9,160 cfs. Water temperatures ranged from 10-11º C.

Captured fish were identified to species, measured (± 1 mm), and weighed (±1g for fish < 5,000 g or ±10 g for fish > 5,000 g) with a digital scale. In the event that fish weight was not determined, length-weight relationships were built from lengths and weights of fish sampled from the Snake River during 2007. Data were log transformed and linear regression was used to allow estimation of weight. PSD's were calculated to describe length-frequency data for gamefish populations as outlined by Anderson and Neuman (1996). Also, Wr was calculated as an index of general fish body condition, for which a value of 100 is considered average. Values greater than 100 describe robust body condition, whereas values less than 100 indicate less than ideal foraging conditions. Electrofishing effort was converted to hours to standardize CPUE and weight in kg per unit effort (WPUE) indices. Confidence intervals were calculated using an $\alpha = 0.10$. All survey and individual fish data were stored in IDFG's standard stream survey database.

RESULTS AND DISCUSSION

During 2007 Snake River sampling efforts, a total of 995 fish were sampled from 10 different species. Three species of game fish were sampled including hatchery rainbow trout, largemouth bass, and smallmouth bass. Six species of panfish were sampled including, bluegill, black crappie, and yellow perch. Relative abundance of panfish was generally low throughout the study area. Panfish were mostly young-of-the-year individuals presumably produced in C.J. Strike Reservoir and entrained though the dam. Two native, nongame species were sampled including largescale sucker and northern pikeminnow. Finally, two nonnative, nongame species were sampled including common carp and bullhead.

Electrofishing CPUE for all species combined averaged 151 fish/h (±104) for the seven sites sampled during 2007. The highest total CPUE was 457 fish/h for the Corder Creek site. The majority of catch at this site was composed of largescale sucker (CPUE = 451 fish/h); in fact, the CPUE of largescale sucker at this site was over 3-fold higher than for any other fish at any other site. The Clarks Island site had the lowest total CPUE of 58 fish/h. For all sites combined, largescale sucker was the most numerous species sampled and represented 83% of the catch by number, followed by smallmouth bass (6%), common carp (4%), and yellow perch (4%).

Over the seven sites, WPUE for all species combined averaged 250 kg/h (± 185). The highest total WPUE (774 kg/h) occurred at the Corder Creek site, over 99% of which was composed of largescale sucker. The lowest total WPUE (34 kg/h) was documented at the Sinker Creek site, near the upper portion of Swan Falls Reservoir. For all of the sites combined, largescale sucker represented the majority of the fish biomass (87%), followed by common carp (12%), and smallmouth bass (less than 1%) (Figure 26).

Smallmouth bass was the most numerous game fish sampled. Mean CPUE for smallmouth bass was 9.5 fish/h (±14). Smallmouth bass CPUE was highest in the most downstream site: Sinker (52.3 fish/h). The next high catch rate occurred at the Castle site where CPUE equaled 10.1 fish/h. Smallmouth bass CPUE for the remainder of the sites was less than three fish per hour, and no smallmouth bass were caught at three sites. Mean length and weight was 180 ± 15 mm and 156 ± 27g (n = 117) (Figure 27). PSD was 41, calculated from 58 stock length fish (≥180 mm) and 24 quality length fish (≥ 280 mm; Figure 27). Mean Wr of fish longer than 180 mm equaled 100 (± 3.5) and showed no trend across the length of fish examined (slope = -0.03; P = 0.48; n = 58; (Figure 28)). Putative age-0 smallmouth bass were abundant in cobble and boulder-sized shoreline rock cover. Seven rainbow trout were sampled during this effort. All were of hatchery origin, thus presumably originated from fish stocking efforts in C.J. Strike Reservoir. Rainbow trout ranged in length from 265 to 435 mm and showed no trend in distribution.

In summary, the fish population in the Snake River from C.J. Strike Dam to Swan Falls Reservoir was composed primarily of non game fish, particularly largescale sucker. Smallmouth bass were the most abundant sport fish in this reach. Few other game or panfish were sampled. Smallmouth bass were generally in good body condition and a wide range of lengths were present. The highest abundance of smallmouth bass was in the most downstream site. Three other sampling efforts have been completed by IDFG in this reach (Table 8). In 1972, 14 different species were sampled from Swan Falls Dam to Grandview and total CPUE equaled 152.7 fish/night (Reid et al. 1973). Total CPUE was very similar to the present study; however, species composition changed quite dramatically. Common carp declined from 62.8 to 5.7 fish/h, whereas mountain whitefish and northern pikeminnow combined declined from 16 fish/h in 1972 to nearly zero in 2007. Comparisons with data collected in 1973 show similar trends. In 1973, 14 different species were sampled from Grandview to C.J. Strike Dam and total CPUE equaled 320 fish/h (Gibson 1974). The largest difference between these studies and the present effort

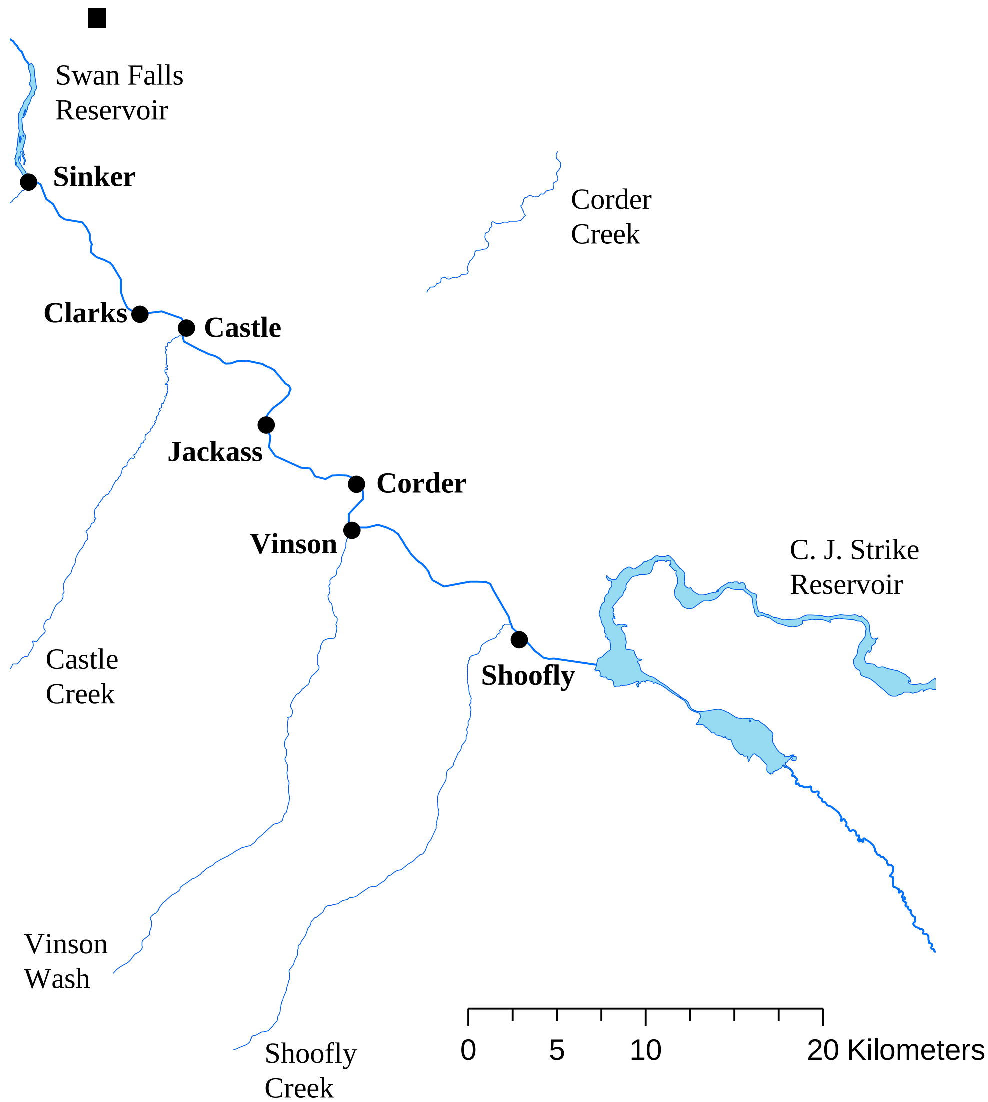


Figure 25. Location of 7 sites sampled during 2007 to characterize the fish community in the Snake River from C. J. Strike Dam downstream to Swan Falls Reservoir. Black dots and bolded text denote the upstream starting point for fish sampling sites.

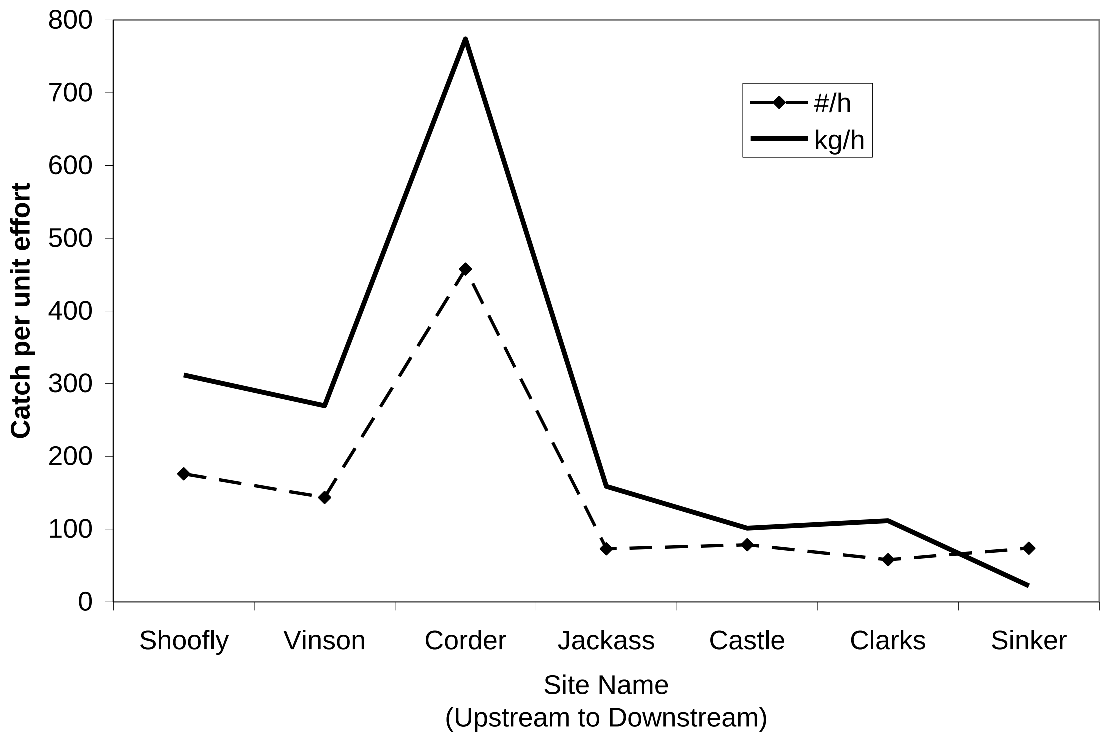


Figure 26. Abundance and biomass indices for seven sampling sites used to monitor fish populations in the Snake River from C. J. Strike Dam to Swan Falls Dam during 2007.

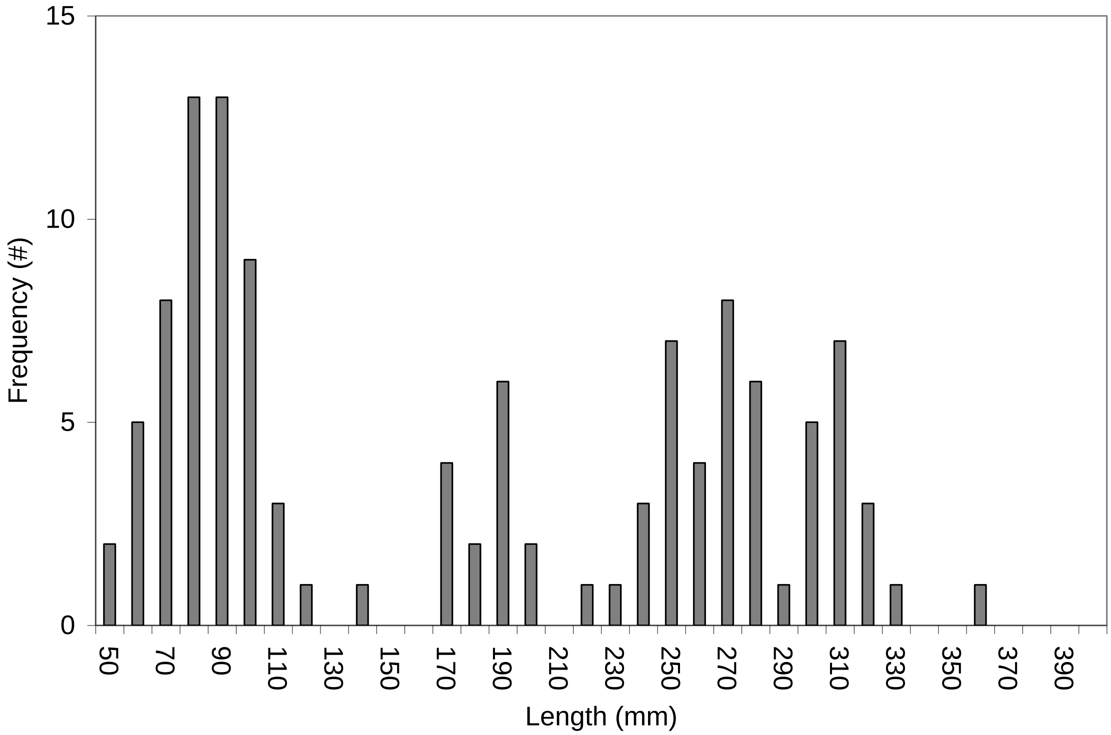


Figure 27. Length frequency of smallmouth bass captured in the Snake River from C. J. Dam to Swan Fall Dam during 2007.

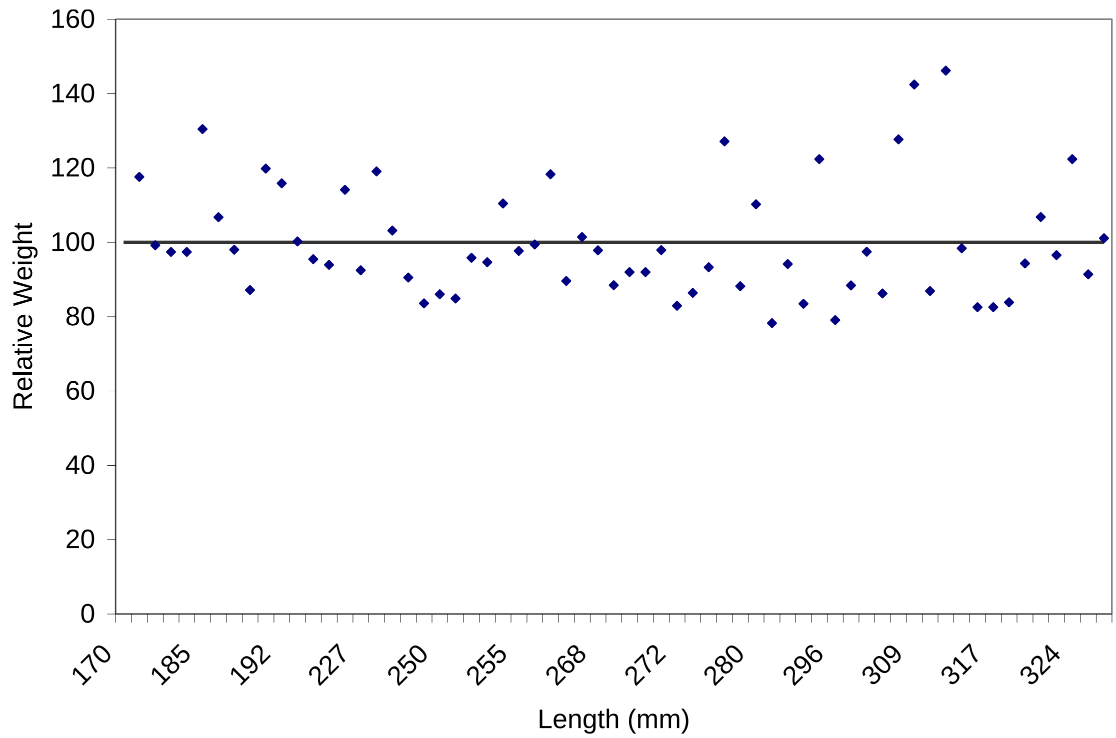


Figure 28. Relative weight of smallmouth bass captured in the Snake River from C. J. Dam to Swan Falls Dam during 2007.

was in CPUE for common carp and overall species diversity. In 1973, CPUE for common carp was 139 fish/hour; whereas in 2007, it was less than 6 fish/hour (Table 8). Species diversity also seemed to decline substantially between these two studies. Six fewer species were caught during 2007 than in 1973. The 1972 and 1973 studies had a much higher prevalence of native species including chiselmouth *Acrocheilus alutaceus*, mountain whitefish, northern pikeminnow, peamouth *Mylocheilus caurinus*, redside shiner, and sculpin spp., whereas only two northern pikeminnow were sampled during 2007. A similar study was conducted in 1995 (Allen et al. 1998). Overall, CPUE was much lower (32 fish/h) due to probable equipment malfunction. Despite the low catch rate, the 1995 survey indicated a relatively large proportion of the catch was composed of common carp, whereas in 2007 common carp were much less common. Furthermore, the 1995 study documented the presence of northern pikeminnow and chiselmouth. The proportion of smallmouth bass within the catch increased across the four studies from 1972 through 2007.

Although these three studies were conducted within the same river reach and used the same gear type, boat electrofishing, differences in equipment performance, study site location, and timing added uncertainty to comparisons across time. For instance, the three prior studies were conducted from mid July to September, whereas we were unable to sample the Snake River until October when macrophyte beds had died down. Correspondingly, water temperatures had dropped to 10-12º C and may have influenced fish distribution and catchability. It is impossible to compare gear efficiency across these studies as no attempt was made to do so; however, from total CPUE alone, it is evident that sampling efficiency was poor during 1995. Even with these uncertainties, a couple of trends stand out. First, abundance of common carp during 2007 was much lower than for the previous three surveys, for which they comprised 40-50% of the total catch. Secondly, the proportion of smallmouth bass in relation to the total catch has increased through time from 0% in 1972 and 1973 to 7% in 1995 to 11% in 2007. Finally, species diversity and the abundance of native fish (excluding largescale sucker) has declined in this reach of the Snake River similar to fish population trends downstream of Swan Fall Dam (Kozfkay et al. In Press).

MANAGEMENT RECOMMENDATIONS

1. Repeat survey methodology and locations in five to ten years to track trends in fish populations

2. Gain a better understanding of smallmouth bass population dynamics in this reach by estimating angler exploitation, age structure, and growth rates, as little is known about this population.

Table 8. Electrofishing catch per unit effort (CPUE) for electrofishing surveys conducted on the Snake River between C.J. Strike Dam and Swan Falls Dam.

Species	1972 Mean CPUE (#/hour)	1973 Mean CPUE (#/ hour)	1995 Mean CPUE (#/ hour)	2007 Mean CPUE (#/ hour)
Black Crappie	4.7	13.8	0.7	2.0
Bluegill	4.9	1.1	--	0.4
Bullhead	--	--	--	0.5
Common Carp	62.8	138.7	18.5	5.7
Chiselmouth	--	0.2	0.7	--
Largemouth Bass	--	2.9	--	0.3
Largescale Sucker	61.1	119.9	3.7	122.1
Mountain whitefish	5.8	23.6	--	--
Northern pikeminnow	9.2	11.5	1.5	0.1
Peamouth	--	4.3	--	--
Pumpkinseed	--	1.3	--	--
Rainbow Trout (hatchery)	--	1.1	--	1.1
Rainbow Trout (wild)	--	0.4	--	--
Redside shiner	--	0.2	--	--
Sculpin		0.2	--	--
Smallmouth Bass	--	--	2.2	16.8
White crappie	--	--	5.2	--
Yellow Perch	--	0.8	--	8.1
Other	4.3	--	--	--
Total of all species	152.7	320	32	151

Angling for white sturgeon in the Snake River downstream of C.J. Strike Dam

INTRODUCTION

Prior to significant modification of riverine habitat in the Snake River, white sturgeon in Idaho likely exhibited long distance seasonal migrations within the Snake River and farther downstream to preferred spawning, feeding, and over-wintering habitats. Upstream movements of white sturgeon within the Idaho section of the Snake River were blocked by the completion of nine main stem Snake River dams downstream of Shoshone Falls from 1901 through 1972. Additionally, recreational angler and commercial harvest of white sturgeon probably exceeded replacement levels until 1972 when Idaho implemented catch and release regulations (Cochnauer 2002).

Presently, nine sub-populations of white sturgeon exist in Idaho within their native range, only two of which may be deemed healthy. The populations downstream of Hells Canyon and Bliss dams exhibit natural reproduction, normally shaped length/age frequencies, and possess adult populations of over 3,000 individuals (Idaho Power Company 2005). Another six sub-populations exist in a depressed state with low population abundance (less than 200 wild individuals) as well as inadequate recruitment.

The several of the remaining sub-populations reside within the Snake River from C.J. Strike Dam downstream approximately 58 river km to Swan Falls Dam, hereafter referred to as the C.J. Strike population. This population possesses an intermediate abundance of adult sized fish when compared to other Idaho white sturgeon populations. Idaho Power estimated that the C.J. Strike white sturgeon population was comprised of 725 individuals > 70 cm total length during 1996-1997 (Idaho Power Company 2003). A more recent population survey indicated that the white sturgeon population during 2005-2006 had declined to 566 individuals (Ken Lepla, Idaho Power Company, pers. comm). Unfortunately, the length frequencies for both of these surveys indicated a paucity of fish less than 91 cm. Anecdotal reports by sport anglers support this notion as small fish have been infrequently caught. Inadequate recruitment has likely caused this population imbalance.

In modified habitats, sturgeon populations are often prone to recruitment failure. Blocked migration routes, reservoir capture of spring high flows, modification of thermal regimes, low adult population abundance, and inadequate lengths of free-flowing river segments have been implicated in the declines of other sturgeon populations usually through disruption of successful recruitment. Some or all of these factors have contributed to the recent decline and the continual depressed state of the C.J. Strike population.

Furthermore, the effects of fishing mortality may be contributing to the low population abundance of white sturgeon below C.J. Strike dam. The C.J. Strike population supports a year-round, focused, and presumably intense catch-and-release fishery. A very high percentage (~95%) of the total fishing effort occurs immediately below the dam within the tailrace, where sturgeon often congregate. In addition, jet boat anglers target white sturgeon mostly upstream of Grandview, ID. Little sturgeon fishing effort occurs downstream of Grandview. Post release mortality rates and possible sub lethal effects of this fishery are unknown and may be difficult, if not impossible, to estimate. Mortality rates associated with catch-and-release fisheries have been well studied in short lived species such as largemouth bass and walleye *Sander vitreus* (see review by Arlinghaus et al. 2007). The possible sub-lethal effect of catch-and-release fishing has only recently gained attention from fisheries scientists. We are aware of no studies designed to assess the impacts of catch-and-release fisheries on sturgeon populations. Although we will not be able to address mortality rates or sub-lethal effects associated with catch-and-release sturgeon fishing, it is still important to gain an understanding of the magnitude and nature of this fishery to determine whether current fishing levels could be reasonably assumed to be affecting mortality or recruitment success and, therefore, population abundance.

OBJECTIVES

1. To estimate fishing effort, catch rate, and total annual catch of white sturgeon in the Snake River from C.J. Strike Dam to Grandview, Idaho (Highway 67 Bridge).

2. To compare sturgeon total annual catch to recent population size estimates.

3. To determine the average number of times sturgeon from this population are caught, annually.

4. To compare fishing effort and catch rates among months as well as between weekdays and weekends/holidays.

METHODS

Recreational fishing effort, catch rate, and total annual catch of white sturgeon between C.J. Strike Dam and Grandview, ID (Figure 29) were estimated using a combination creel survey method: the roving-access design (Pollock et al. 1994). Estimates of effort and catch rate were summarized by month from May 1, 2007 to April 30, 2008. Sampling periods were determined using a stratified random sampling methodology. Within months, primary sampling units were days. Days were stratified into two categories: 1) weekdays, and 2) weekends and holidays. Four primary sampling units were selected from each of these two categories for a total of 8 sampled days per month. Days were then divided into three, eight hour periods (secondary sampling units). These periods included morning (4 am to 12 pm), afternoon (12 pm – 8 pm), and night (8 pm to 4 am). Secondary sampling units were selected with non-uniform probabilities based on effort information provided by IDFG conservation officers and Idaho Power dam operators (Stanovich and Nielsen 1991). During suspected high use periods (February-September), time periods were selected at probabilities of 0.10 for morning, 0.4 for afternoon, and 0.5 for night. During the suspected low use periods (October-January), time periods were selected at probabilities of 0.10 for morning, 0.60 for afternoon, and 0.30 for night.

We used roving instantaneous counts to estimate effort. Instantaneous counts of fishing effort were made by roving through the fishery on foot and with a vehicle on nearby roads where sturgeon anglers were counted using binoculars. In addition, the number of boat trailers were counted at the two ramp sites (Wooden bridge and Grandview city ramps) used by sturgeon anglers. The number of boat anglers was expanded by determining the average number of sturgeon anglers per boat. To complete these counts, a consistent route was followed. The route began on foot at Idaho Power's Scout Park, and then proceeded to the south side of the tailrace, then westward on Rim and Hayland roads along the north side of the river to Highway 67. After crossing the Highway 67 Bridge, creel clerk(s) turned eastward and traveled on River Road along the south side of the river to the point of origin. Within an eight hour survey period, three instantaneous counts were conducted at the mid point of randomly selected hours. For each survey day, a mean instantaneous count was determined and then divided by the selection probability. Daily effort values were averaged for the weekday and weekend/holidays, separately. Average effort values were then expanded by the number of weekdays or weekend/holidays days per month.

Catch rates were determined from a combination of angler interviews, sturgeon report cards, and follow up phone calls. Only completed trip information was used for catch rate estimation. Creel clerks conducted on site interviews on the same days as instantaneous counts. As anglers often fished for several days, creel clerks filled out cards for anglers that had fished previous days or had finished fishing for the day. For incomplete trips and future days, creel clerks handed out pre-paid, self-addressed sturgeon report cards (Figure 30) to sturgeon anglers. Anglers were asked to fill out the card and return it through the mail, at several nearby drop boxes, or to IDFG personnel. If report cards were not returned within two weeks (to reduce recall and non-response bias) of initial contact, follow up phone calls were made to collect catch information. If anglers could not be re-contacted after three attempts report cards were considered incomplete. Total catch for the month was divided by the total number of hours fished per month to determine average catch rate (i.e. ratio of means). In addition, anglers were asked to determine whether landed fish were less than 91 cm, 92 – 183 cm, or greater than 183 cm to allow comparisons with population monitoring data.

RESULTS

At the time of report compilation, summarized CPUE, effort, and catch rate estimates were available for May through the end of November 2007. Fishery data for the remainder of the survey will be reported in the subsequent annual report. Over the first seven months, a total of 905 sturgeon report cards were either completed on site by creel clerks or provided to anglers. Complete trip information was available from 766 report cards (i.e. individual fishing trips) or 85% of contacts yielded completed trip information.

Over the seven months, CPUE averaged 0.063 fish/hour or one fish landed for every 16 hours of angling effort. CPUE ranged from a minimum 0.033 fish/hour in August (1 fish for every 30 hours of angling effort) to a maximum of 0.103 fish/hour in July (1 fish for every 10 hours of angling effort).

Over the same time period, monthly effort estimates (by bank anglers only) ranged from a minimum of 1,160 hours expended during October to a maximum of 4,713 hours expended during June. Overall, monthly effort averaged 2,931 hours. Boat angling effort was a small proportion of total effort. These estimates will be included in the final completion report.

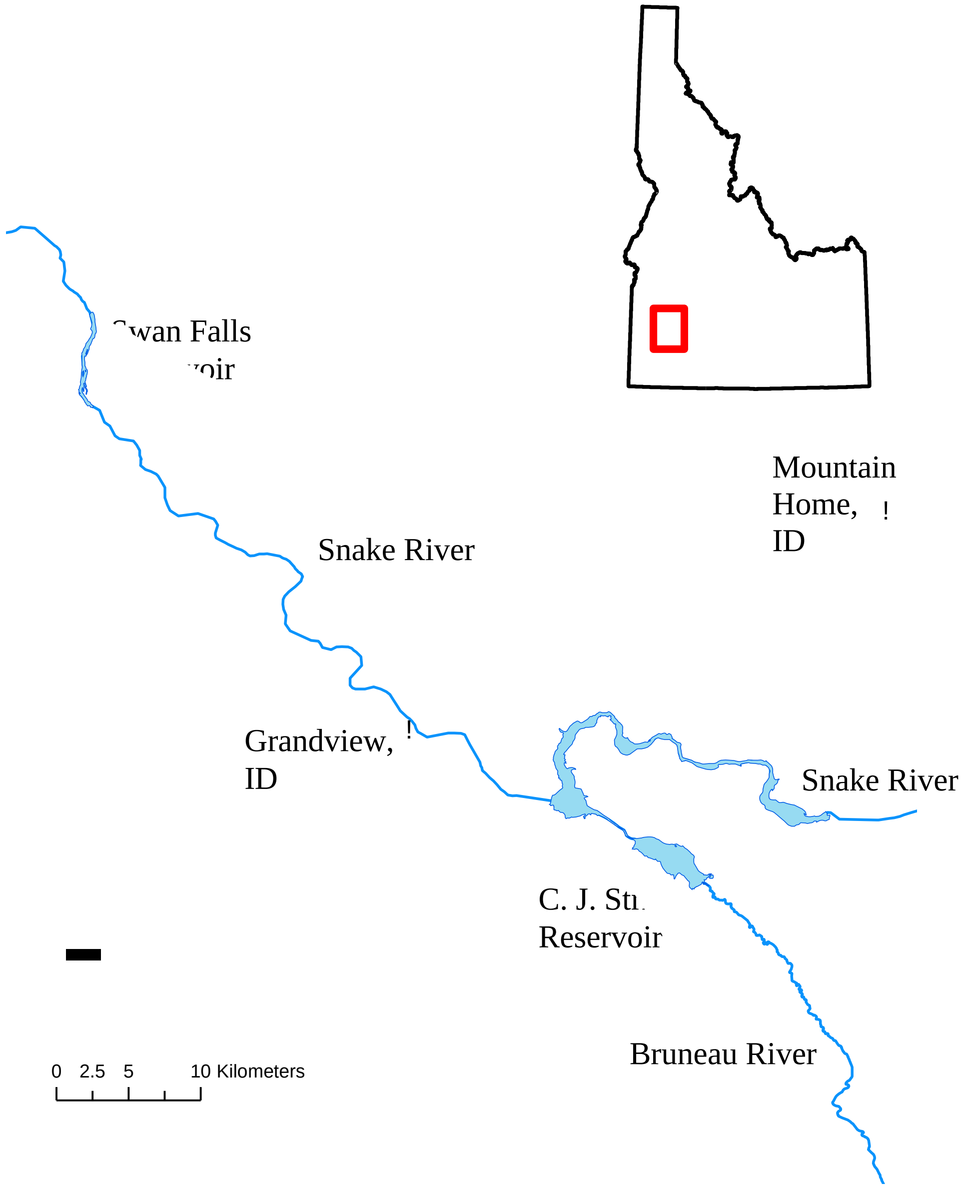


Figure 29. Map of the Snake River in southwestern Idaho. Creel survey efforts were focused from Grandview, ID to C. J. Strike Dam.

STURGEON REPORT CARD

What time did you start and stop fishing today? M Tu Wed Th Fr Sa Su Date ______

1st time Start time: __________ am or pm Stop time: __________ am or pm

2nd time Start time: __________ am or pm Stop time: __________ am or pm
Note: Noon = 12 pm Midnight = 12 am

Did you land a sturgeon today? ☐ No ☐ Yes If yes, how many? _________

How many of the sturgeon you landed to day were:
Less than 3 ft? ______________
3 ft. to 6 ft.? _______________
More than 6 ft? _____________

Did you hook, fight, & lose any sturgeon today: ☐ Yes If yes, how many? ____________
☐ No

Comments: ____

____

________________ Office Use: ☐ mail ☐ IDFG personnel ☐ drop box ☐ follow-up phone

Figure 30. Example of a sturgeon report card that was given to anglers during 2007-2008 creel survey efforts.

Combining these two estimates for bank anglers only, monthly catch estimates ranged from 71 fish during July to 486 fish in June. Overall, catch averaged 187 fish per month and total catch over the first seven months equaled 1,307 fish. Additionally, we estimated the number of sturgeon lost during this time period. These estimates ranged from 55 fish during October to 390 fish in June. Overall, the number of sturgeon hooked and lost averaged 219 fish per month and totaled 1,535 sturgeon.

DISCUSSION

The most recent population estimate indicated that there are approximately 566 sturgeon over 70 cm within the C.J. Strike reach. Comparing this with our catch and hooked, fought, and lost estimates, an average sturgeon in this population was landed 2.3 times during the first seven months of this creel survey and hooked, fought, and lost an additional 2.7 times. Creel surveys will continue through April 2008. Final calculations will increase these catch estimates as the number of fish caught or lost by boat anglers has yet to be included. Furthermore, variance estimates will be presented at a later date.

APPENDIX

Effort was estimated as

$$\hat{e}_i = I_i \times T$$

Total effort was estimated as

$$\hat{E} = \sum_{i=1}^{n} (\hat{e}_i / \Pi_i)$$

Catch was estimated as

$$\hat{C} = \hat{E} \times R_1$$

Catch rate from completed trips was calculated as

$$R_1 = \sum_{i=1}^{n} c_i \Big/ \sum_{i=1}^{n} L_i$$

Where,

I_i = mean of 3 instantaneous counts within a morning, afternoon, or night
T = time period length which equaled 8 hours for this study
Π_i = probability of selecting morning, afternoon, or night
R_1 = ratio of means estimator used to calculate mean catch rate by month
c_i = catch of sturgeon for an individual completed fishing trip
L_i = duration of effort (hours) for an individual completed fishing trip

Boise River Electrofishing Survey

INTRODUCTION

The lower Boise River is a heavily used urban fishery located in the heart of the City of Boise. Sampling efforts prior to 2004 captured few wild trout and anecdotal information suggests that the number of wild rainbow and brown trout *Salmo trutta* in the river has improved over the last 20 years. Standardized population monitoring sections were established in 2004 to estimate populations of wild rainbow, brown trout and mountain whitefish in the lower Boise River between Barber Park and the East Parkcenter Bridge. Sampling was repeated in 2007 to compare population abundance and size structure. Some local anglers have expressed interest in expanding the boundaries of the quality trout regulation area on the lower Boise River. The population survey data will be used in conjunction with age and growth data (collected in 2005 with analysis pending), and creel survey information conducted from June 2007 to July 2008 to characterize the fishery and the potential for the wild trout population to respond to special regulations.

METHODS

The lower Boise River from Barber Park downstream to the Parkcenter Boulevard Bridge has three trend monitoring sections that are electrofished to evaluate trout and mountain whitefish populations. The sections were established in 2004 and each section is approximately one km. The upper section begins at the first diversion below Barber Park and continues down to the Logger's Creek diversion. The middle section starts at the canal diversion and stops downstream at the first riffle below the outlet of Heron Lake. The lower section begins at the first riffle above the East River Boise River Footbridge and continues to the first riffle above the Parkcenter Bridge. The middle section occurs in a quality regulation section of the Boise River, which restricts harvest to two trout over 350 mm.

We used mark-recapture techniques to estimate abundance of trout and mountain whitefish in each section. Flows during sampling were 239 to 241 cfs measured at the Glenwood gauging station. Fish were collected with a canoe electrofishing unit consisting of a 5.2 m Grumman aluminum canoe fitted with two mobile anodes connected to 15.2 m cables. The canoe served as the cathode and carried the generator, Coffelt VVP-15, and a live well for holding fish. Oxygen was introduced to the live well (2 l/minute) through an air-stone. Pulsed direct current was produced by a 5,000 watt generator (Honda EG500X). Frequency was set at 60 pulses per second and a pulse width of 60-80, with an output of 4-5 amperes. Crews consisted of seven to eight people. Two operators managed the mobile anodes, one person guided the canoe and operated the safety switch controlling the output, the remaining crew of four or five people were equipped with dip nets to capture stunned fish. Only trout and mountain whitefish were placed in the live well.

Marking and recapture runs were conducted with a single pass from upstream to downstream. The canoe was held upstream of the anode operators. Anodes were swept through the water or thrown across the stream and retrieved. Crews with dip nets walked backward facing upstream, while staying downstream of the anodes and capturing stunned fish. Fish were placed in the live well. When the live well was judged to be at capacity the crew stopped at the nearest riffle to process fish.

Marking runs were completed on October 24-25. Rainbow trout, brown trout, and mountain whitefish were marked with a 7 mm diameter hole from a standard paper punch on the upper, middle or lower section of the caudal fin corresponding to their capture reach. Only trout >100 mm and mountain whitefish > 120 mm were marked. Fish were measured for total length (mm) and a subset was weighed (g). Fish were released 50 to 100 m upstream from the processing site to prevent them from drifting downstream into the next section of water to be sampled. Recapture sampling was completed on October 29-30. During the recapture effort all mountain whitefish and trout greater than 100 mm were captured and placed in the live well. Fish were examined for marks on the caudal fin. All fish were measured for length (mm). Data are stored in the IDFG stream survey database.

To account for selectivity of electrofishing gear population estimates (N) were calculated using a maximum likelihood estimation to fit the recapture data. A capture probability function of the form

$$Eff = (exp(-5+\beta_1 L+ \beta_2 L^2)) /(1+ exp(-5+\beta_1 L+ \beta_2 L^2))$$

where Eff is the probability of capturing a fish of length L, and β_1 and β_2 are estimated parameters (MFWP 2004). Then N is estimated by length group where M is the number of fish marked by length group.

$$N = M / Eff$$

Population estimates were calculated for each reach and expressed as number of fish/km for comparison to previous surveys. Four mountain whitefish mortalities were excluded from the population estimates.

RESULTS AND DISCUSSION

We captured 581 wild rainbow trout, 39 hatchery rainbow trout, 111 wild brown trout and 2,986 mountain whitefish during the 2007 electrofishing survey. Equipment problems precluded an estimate of trout/whitefish abundance for the lower and upper trend sections so the results and discussion will focus on the middle section only. All brown trout in the Boise River are wild and hatchery rainbow trout are excluded from the estimates.

We observed fewer large brown trout but more juveniles than in the 2004. Fifty three percent of the brown trout captured in 2007 were less than 200 mm compared to

37% in 2004. In 2007, 16% of the brown trout captured were over 350 mm compared to 27% in 2004 (Figure 31).

We observed more juvenile wild rainbow trout but fewer mid-sized wild rainbow trout than in 2004. For wild rainbow trout in the Boise River 72% were less than 200 mm in 2007 with only 42% less than 200 mm in 2004. Rainbow trout over 350 mm were 5% of the total capture in 2007 and 5% in 2004 (Figure 32). Mountain whitefish over 350 mm were 20% of the capture in 2004 and 17% in 2007 (Figure 33).

We estimated the wild brown trout population to be 216 fish/km and the rainbow trout population 1,253 fish/km over 100 mm for the 1.08 km section. We estimated a mountain whitefish population for this section at 3,131 fish/km over 125 mm. The population estimates for brown trout and rainbow trout were lower for both rainbow trout and brown trout in 2007 compared to the 2004 estimates, but 95% confidence intervals overlapped between years (Figure 34).

The lower Boise River is a heavily used urban fishery (Hebdon et al. 2008). The middle reach is within the boundaries of the special trout regulation water. Current efforts to estimate angler exploitation and evaluate the age and growth of the wild rainbow and brown trout populations will allow us to gain a better understanding of the population dynamics of this reach It will also allow us to model the potential for a population response due to alternative regulation proposals.

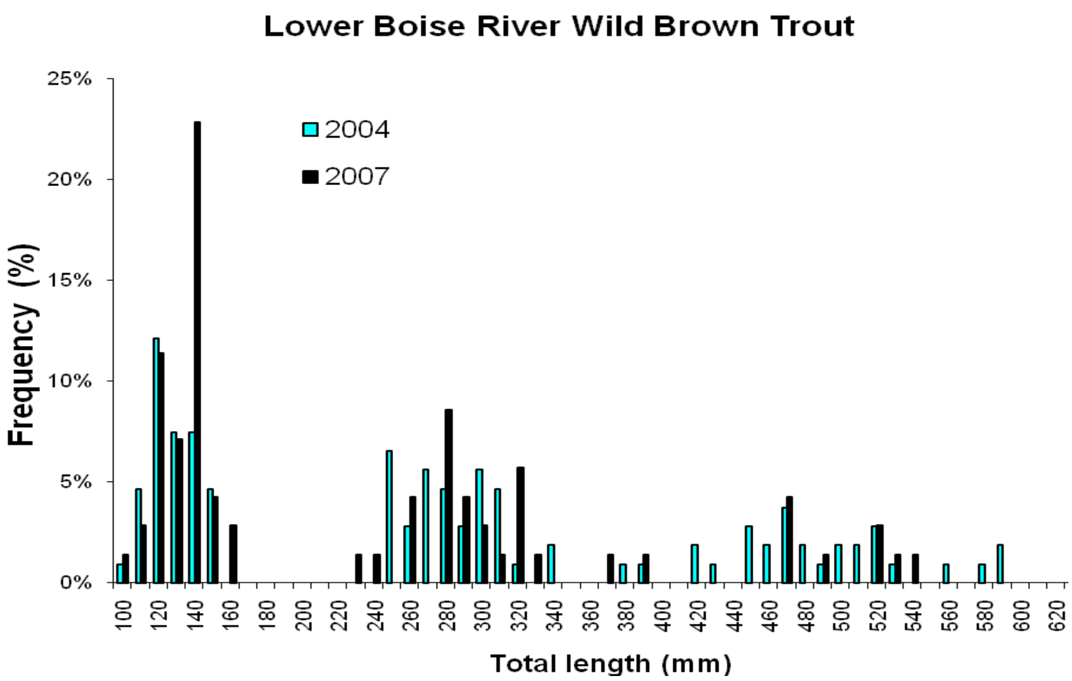


Figure 31. Size structure of brown trout captured on the middle section of the lower Boise River for 2004 (n=107) and 2007 (n=70). Recaptures are not included.

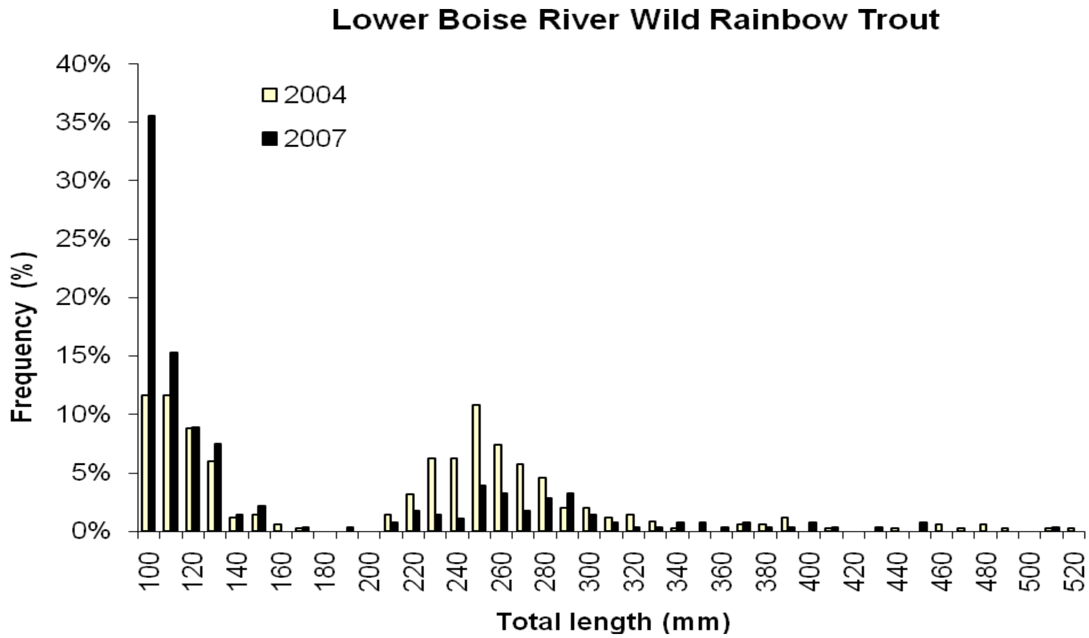


Figure 32. Size structure of wild rainbow trout captured in the middle section of the lower Boise River for 2004 (n=351) and 2007 (n=281). Recaptures are not included.

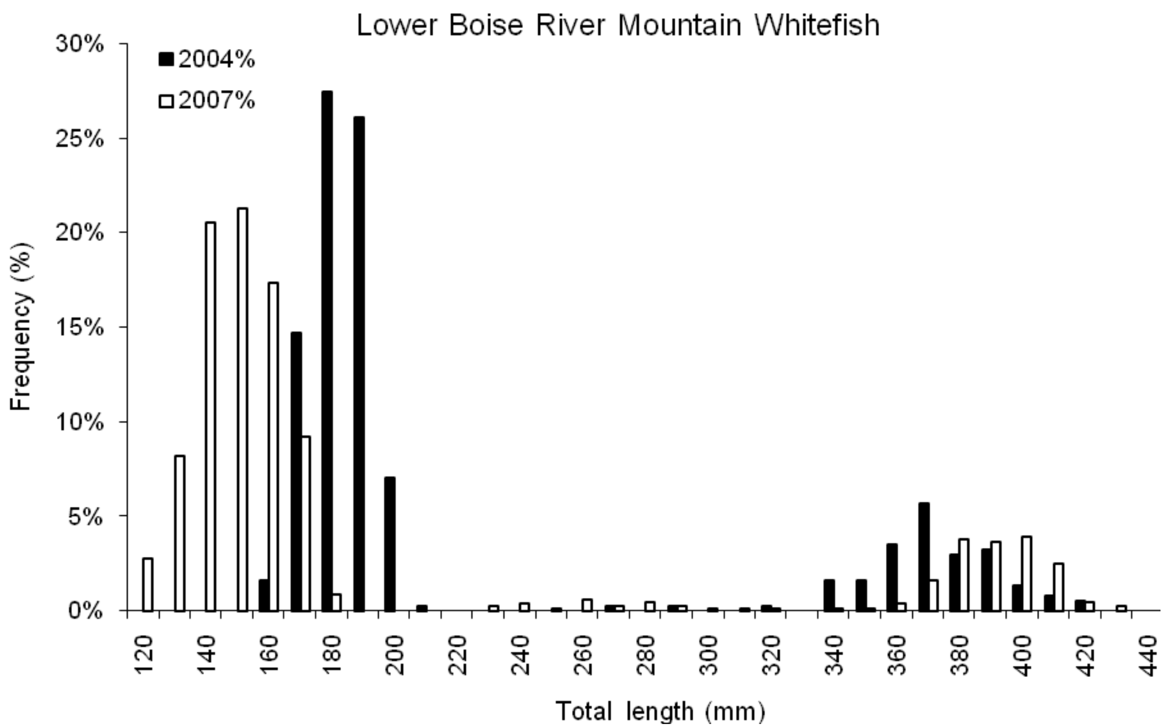


Figure 33. Size structure of mountain whitefish captured in the lower Boise River for 2004 (n= 367) and 2007 (n= 793). Recaptures are not included.

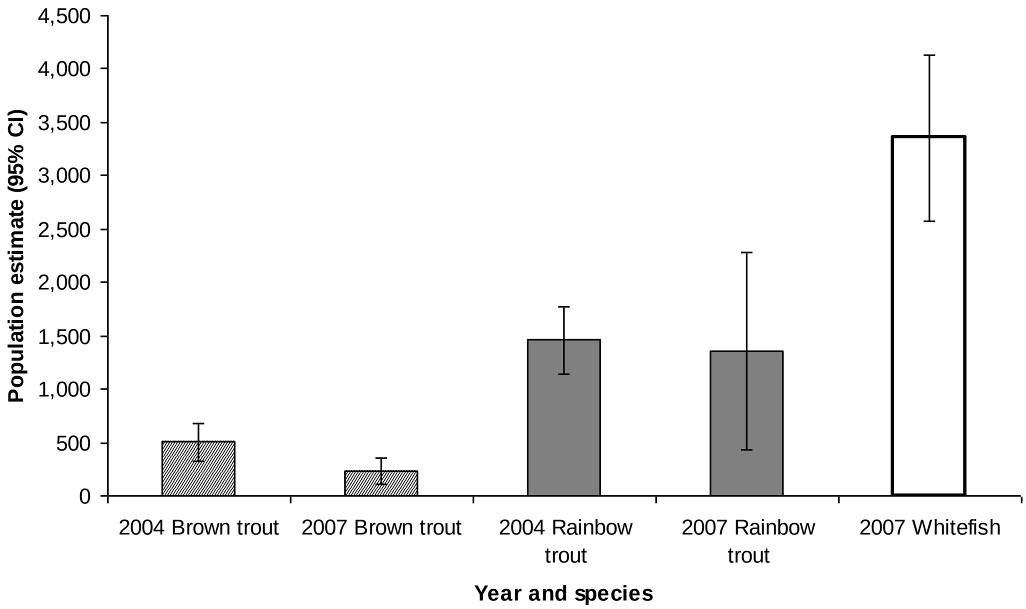


Figure 34. Population estimates for the middle section of the lower Boise River for wild brown trout, wild rainbow trout and mountain whitefish for 2004 and 2007. No estimate of mountain whitefish abundance was made in 2004. Error bars represent 95% CI for the population estimates.

MANAGEMENT RECOMMENDATIONS

1) Continue periodic population monitoring on the urban reach.
2) Evaluate age, growth and mortality of the lower Boise River rainbow and brown trout population.
3) Evaluate angler harvest of wild rainbow trout in the lower Boise River.

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